BUILD A LOW-DOLLAR PARK FLYER

FREE TRIAL OFFER
RC MICROFLIGHT ONLINE

page 157

MODEL Airplane NEWS

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MICROFLYING GUIDE
20 planes
and all you need to get started

4 GREAT HOW TO's
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Cut ribs the EZ way

Build a remote ignition starter

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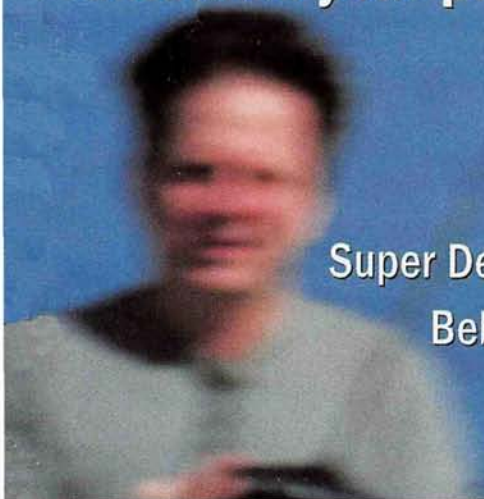

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J-3 Piper Cub—.60-size ARF

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MODEL Airplane NEWS

JUNE 2001 • VOLUME 129, NUMBER 6

ON THE COVER: main image—backyard RC at its best; the Hangar 9 E-series Fokker Eindecker park flyer, flown by senior editor Chris Chianelli. Inset—the Thunder Tiger ARC Piper Cub.

Features

Construction

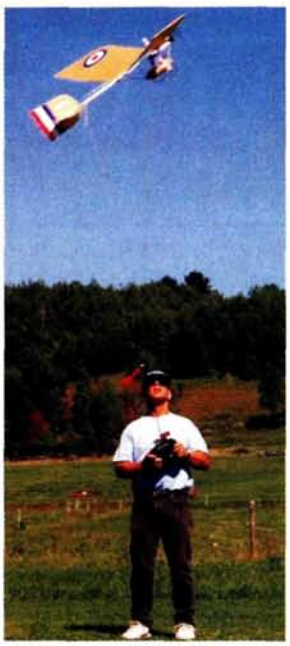
Field & Bench Reviews

Columns

Departments

Fly RC nearly anywhere, anytime

The new wave of small RC aircraft equipped with tiny plug-and-play servos, radios and motors is revolutionizing the hobby. Today, building a model that weighs between 5 and 15 ounces and that flies at between 5 and 10 miles per hour is inexpensive and simple. Whether you refer to them as park, slow, backyard, or micro flyers, these diminutive dynamos are here to stay, and the fun is just beginning.



Nick Ziroli Sr. flies the Ikarus Blériot III.

The large variety of ARFs and preassembled micro flyers has reduced the time needed to get into the air from a few *evenings* to a few *hours* (and sometimes, to minutes). Such models range from sport scale to aerobatic aircraft to pylon racers to trainers, and the sky is the limit.

Why is this happening now? You may have heard of Moore's Law, which is based on an observation made by Gordon Moore in 1965. Loosely paraphrased, it holds that every 18 months or so, computer chips double in power or halve in size (and, as many have pointed out, they often halve in price). This phenomenon has made hand-held computers, tiny cell phones, desktop supercomputers and now, inexpensive plug-and-play micro RC aircraft a reality.

Will we soon be flying aerobatic routines with RC models of peanut-scale size? Will slow-motion pylon races be a commonplace at backyard barbecues? Will most families eventually purchase tiny, lightweight RC aircraft for outdoor fun? We are amazed at the rapid progress of this branch of our hobby, and modelers are paving the way. Just consider Dave Robelen's 2.5-ounce, scale P-51 Mustang that loops, rolls and maintains cruising flight for 4 minutes using a tiny 50mAh Ni-Cd battery pack. The Micro Mustang has a climb rate of about 200 feet per minute and has scale-like flight characteristics. You can read more about that airplane and download its building plan free from *RC MicroFlight*, an online and print newsletter that is a sister publication to *Model Airplane News*.

Free Web access. Our feature article, "Backyard Revolution," starting on page 32, offers an overview of aircraft and systems that are at the heart of this emerging RC arena. If that introduction whets your appetite, we are offering *Model Airplane News* readers free online access to *RC MicroFlight* during a two-week period beginning April 23. Just go to ***www.rcmicroflight.com/freetrial*** to obtain a free password that will enable you to visit ***www.rcmicroflight.com*** and peruse 18 months' worth of back issues.

While at the site, you can read about Dave Robelen's Mustang and many other innovative designs. You can view online video clips of a variety of micro flyers in the air and peruse product reviews, technology reports, how-to's and more.

If you have questions about park, backyard, or indoor flyers, you can also join the free, slow-flyer "list serve" (look for the "email discussion group" listing in the navbar at the *RC MicroFlight* site). The list serve enables any modeler to communicate with other modelers with similar interests on an email network. Check it out, and find out how easy it has become to fly RC nearly anywhere, anytime.

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AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous number of letters we receive, we cannot respond to every one.

MORE ON LATEX PAINT

Thanks to Roy Vaillancourt for his great article on painting with latex in the April issue. I have noticed for some time that your competition models are painted this way. The technique always struck me as being too good to be true, but Roy's well-written feature convinced me that it's something I should try.

You mentioned that this process can be used with glow power and that all that's needed is a "clear epoxy or polyurethane topcoat after it has dried fully." Have you had success with latex on glow models, and which fuelproof topcoats do you recommend? [email]

JONATHAN RODVIEN

Great "how-to-paint" article! Can you tell me which brand of polyurethane you used for a topcoat (some brands turn yellow), and what you used to thin it? [email]

JIM LYNCH

Jonathan and Jim, I'm glad you liked the article. I haven't used this with a glow engine, mostly because the stuff I build is way too big and heavy for a glow engine, but I have topcoated latex many times. I prefer K&B HobbyPoxy clear; it works very well. Just don't flood it on. Also, wait until the latex has fully cured. I generally model military stuff, so the clear I use is mixed with "satin" hardener. I occasionally add talcum powder to the mix; this works great. Just go easy on the clear. You need little more than a dusting.

Believe it or not, the best clear polyurethane I have used is the water-based stuff from Minwax. I have also used their mineral spirits-based stuff, too. I haven't been too concerned with yellowing, as old WW II birds get better-looking with this "aging" process. The sport models I've done just get treated with auto wax from time to time; this seems to prevent UV rays from turning the clear yellow. Give it a try, and good luck.

ROY VAILLANCOURT

ENGINE TROUBLE

My O.S. .20 quickly floods out (I think) when full throttle is applied after a minute or so of idle running. I noticed that the screws that install the carb were loose, and I may use a filler such as Elmer's glue on the threads to prevent airflow here without getting glue in the carb. Would the passage of air cause this quick throttle die-out? Any help would be greatly appreciated! I look forward to reading your articles, and I enjoy my subscription to *Model Airplane News*.

CHRIS HELONA
Waco, TX

Your throttling problem is common to most 2-stroke cycle engines, Chris. There could be many reasons why your engine is flooding out during throttle-up. Are you certain that the engine is actually quitting rich? If it sputters and spits raw fuel from the carburetor and muffler, you can be assured that it probably is. The following are a few of the most common reasons for this condition.

Air leaks such as the one that you described are a major contributor to unacceptable throttling. Squeezing the carburetor down onto its O-ring seal and securely tightening the two machine screws should take care of the problem. Some resort to silicone sealant at the base of the carburetor to ensure against leaks. I don't think this is necessary if the O-ring is undamaged; plus, you won't have messy goo slathered all over the front of your engine!

Second, the engine must be thoroughly broken in. Don't attempt to establish a reliable idle and transition to wide-open throttle until this has been achieved. Poorly broken-in engines fail to provide an adequate piston-to-cylinder seal (this provides the primary and secondary compression). Primary compression is the driving force behind crankcase scavenging (clearing), while secondary compression conditions the air-fuel mixture before ignition (in the combustion zone). Poorly broken-in engines also demonstrate higher than normal mechanical losses due to friction, and these also work to defeat satisfactory throttling.

The next most common reason for poor throttling is crankcase "loading," which occurs when the idle mixture is too rich. Although the engine seems to idle acceptably, raw fuel accumulates in the crankcase. This happens because the primary component of your fuel—methyl alcohol—doesn't absorb enough heat in its travel between the carb and the crankcase to stay completely vaporized. Because of its high heat of vaporization, methanol is more susceptible to this condition than other common fuels such as gasoline, which require less heat to stay vaporized. Nevertheless, when the throttle is opened suddenly, the strong rush of air through the carburetor rams the accumulated liquid fuel up the bypasses, through the cylinder transfer ports and into the combustion chamber where it promptly extinguishes the formerly incandescent glow-plug element ... and the engine quits rich.

For most engines, the solution to the loading problem is to set the idle rpm at a reasonable level (don't strive for an impossibly low number) while adjusting the idle mixture to a lean, non-loading setting. This requires patience and perseverance on the part of the operator, who must endure the many starts and stops required for adjustments before success is realized ... unless he's lucky! Your O.S. .20 would be doing well to idle between 2,700 and 3,000 rpm; small engines don't have the crankshaft /flywheel action that large engines enjoy due to their relatively small, lightweight propellers—a big, often overlooked factor. Using a slightly larger, heavier propeller will improve all facets of the throttling scenario.

Since the O.S. .20 has an air-bleed-type o carburetor, the air-bleed adjustment screw con trols the idle mixture. By turning the screw out ward (counterclockwise), more air is admitte to the carburetor when the barrel is closed, an the mixture is leaned. Reversing the procedur richens the mixture.

Some other issues to consider: raising th nitromethane content of the fuel mixture by percent will help to improve throttleability. Tr a variety of glow plugs; just be sure that yo use the same "reach" (short) as that recon mended by the manufacturer. An idle-bar plu is often the answer to an engine's sever midrange richness problems. Decreasing th fuel's lubricant percentage a bit (two to thr percent) often helps the crispness of th midrange transition. Note: I'm an advocate relatively high lubricant percentages in the fu mix, so I consider this to be a technique of la resort. Install a glow-driver unit to heat t plug during throttling. Install an aftermark fuel-metering carburetor in place of the a bleed carburetor.

DAVE GIERKE

AIR SCOOP

BY CHRIS CHIANELLI

New products or people behind the scenes: my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

¼-SCALE

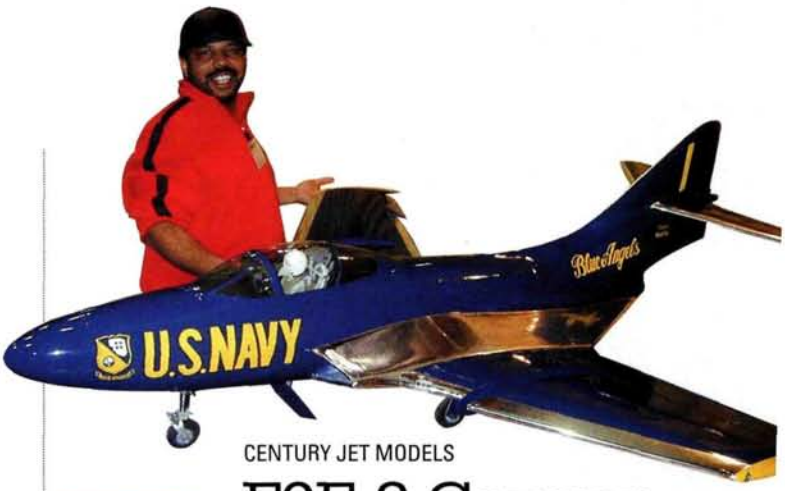
F-1 ARF

Great Planes has captured the "Golden Age" of racing with its new Shoestring ARF, based on the homebuilt racer that first appeared in California in the late 1940s. The design is not just intended for sport racing—it's also capable of aerobatics.

Constructed of balsa, plywood and lightweight fiberglass, the model is finished in Top Flite MonoKote film. The fully symmetrical wing, which accounts for its aerobatic ability, is mounted between a high- and mid-position, and this makes the model both stable and maneuverable, according to Great Planes. At ¼ scale, the Shoestring is IMAA-legal and

has nearly an exact scale outline taken from original 3-view drawings. The kit includes decals, spinner, Great Planes hardware, factory-painted fiberglass wheel pants and a one-piece cowl. Specs: wingspan—61.5 inches; wing area—712.5 square inches; weight—7 pounds; wing loading—22.6 ounces per square foot; engine requirements—2-stroke .61 or 4-stroke .91.

Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.



CENTURY JET MODELS

F9F-8 Cougar

At the recent Westchester Radio Aeromodeler (WRAM) show in White Plains, NY, we bumped into our buddies from Century Jet Models and their newest production version of the Grumman F9F-8 Cougar—the sweptwing version of the Panther. Available now in Basic and Deluxe form and as a complete Deluxe package with retracts, this kit offers many time-saving features, including a one-piece epoxy fuselage that comes already primed and ready to paint, a two-piece canopy/engine hatch, major bulkheads already installed, plug-in wing panels, sheeted wings and stabs, fiberglass flaps and ailerons and installed air intakes. A custom, scale, retractable landing gear is also available. A Ramtec ducted fan, an AMT Mercury or a RAM 750 turbine (turbine modification package available separately) can be used to power this impressive Grumman cat!

Century Jet Models, 11216 Bluegrass Pkwy., Louisville, KY 40299; (502) 266-9234; www.centuryjet.com.

EZ Mustang 45

Patented EZ covering skin techniques create a beautifully simulated polished aluminum appearance on EZ's all-new Mustang 45. Like other EZ scale models (such as the Zero 45 and the Texan), the Mustang is realistically detailed with panel lines, rivets and weathering. The kit includes chrome cowl and spinner, retracts, wheels, fuel tank and bomb. Specs: wingspan—54.7 inches; wing area—532 square inches; power requirement—.40 to .45 2-stroke, or .50 to .70 4-stroke; weight—5.75 to 6 pounds.

Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.

RICHMOND RC

VMAR Pilatus PC9 ARF

With all the great ARFs on the market, manufacturers are under constant pressure to make a model that stands out. Richmond RC's recipe for success lies in the details—lots of them! Check out the twin cockpit; painted pilot figures with full headgear sit overlooking a fully detailed instrument panel; up front are exhaust stacks on the scale fiberglass cowl; even gear struts are included—all pre-installed. The model's finish and graphics match the Pilatus used by the Australian Roulettes RAAF Aerobatic Team.

The model has a wingspan of 57 inches and a dry weight of 5 to 6 pounds, depending on gear. Richmond recommends a .46 to .60ci powerplant and a 4-channel radio with four servos. Retail price: $149.95.

Richmond RC, #114-7350 72nd St., Delta, British Columbia, Canada V4G1H9; USA toll-free (877) 727-2329 or (604) 940-1066; fax (877) 727-2289 or (604) 940-1063.

NELSON HOBBY SPECIALTIES

INTELLIGENT GLOW DRIVER

Most onboard glow-driver circuits function with the throttle channel and are set to turn on or off at predetermined throttle-stick settings. This "intelligent" unit lives up to its name because it operates independently of the throttle channel. Once installed and attached to the engine's glow plug, the unit senses the temperature of the plug's coil 60 times per second. As the glow-plug's temperature changes, its resistance also changes, and the glow driver compensates by turning the current to the plug on or off. After you've installed the driver, run the engine at full throttle and at idle to tell the unit what the engine's normal range is. Then set a potentiometer, and the unit does the rest. Because it turns on only when the plug cools off and not when the throttle is at a predetermined position, the onboard drive battery lasts much longer.

The 1.5-ounce unit also acts as a receiver battery sensor, and an LED will flash when your pack drops below 4.4 volts.

Nelson Hobby Specialties, 394 S.W. 211th Ave., Aloha, OR 97006; toll-free (877) 263-5766; (503) 259-8899; wwwnelsonhobby.com.

VAILLY AVIATION

Robust Retracts

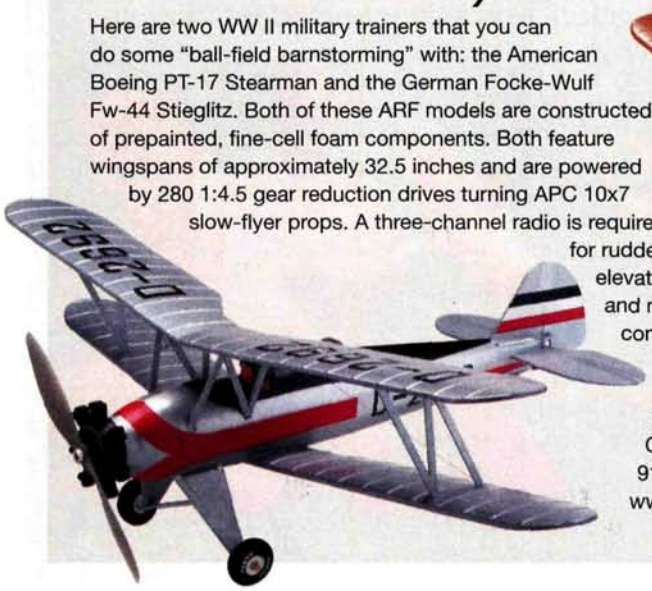
Big warbirds need strong landing gear, and Roy Vaillancourt of Vailly Aviation has come up with retracts that are up to the task.

Available for all Vailly Aviation aircraft, Robust Retracts are made of aircraft-grade 6061-T6 or 7075-T6 aluminum, and many of the units' high-stress areas are made of stainless steel. All units come with ¼-inch music-wire axles and are beautifully machined for scale appearance and function. No plastic parts are used, and all the units are pneumatically driven. Robust Retracts can be installed in other companies' giant-scale aircraft designs.

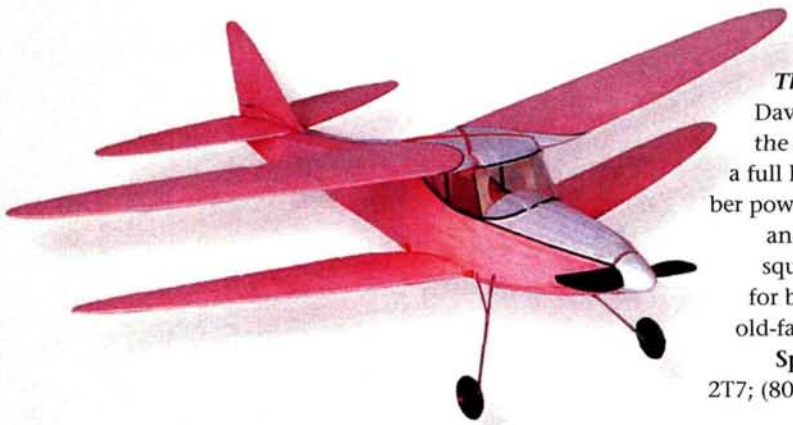
Vailly Aviation, 18 Oakdale Ave. Farmingville, NY 11738-2828; (631) 732-4715; www.vaillyaviation.com

Robbe "backyard" bipes

Here are two WW II military trainers that you can do some "ball-field barnstorming" with: the American Boeing PT-17 Stearman and the German Focke-Wulf Fw-44 Stieglitz. Both of these ARF models are constructed of prepainted, fine-cell foam components. Both feature wingspans of approximately 32.5 inches and are powered by 280 1:4.5 gear reduction drives turning APC 10x7 slow-flyer props. A three-channel radio is required for rudder, elevator and motor control.



Robbe Model Sport; distributed by Aveox Electric Flight Systems, 31324 Via Colinas, #103, Westlake Village, CA 91362; (818) 597-8915; fax (818) 597-0617; www.robbe.com.



SPIRIT OF YESTERYEAR

Satin Doll

These are the good old days

Dave Platt is known for the craftsmanship of his scale designs, and the Satin Doll is no exception. The kit features all laser-cut parts and a full hardware package, including wheels. Originally designed for rubber power, the Satin Doll now flies with a geared Speed 280 or Speed 400 and 600mAh cells. The wingspan is 41⅜ inches, and it has 400 square inches of wing area. Lightweight radio gear is recommended for best performance, and tissue or Litespan will give it just the right old-fashioned character.

Spirit of Yesteryear, 40 Holgate St., Barrie, Ontario, Canada L4N 2T7; (800) 670-5468.

BATTERIES AMERICA

Lithium battery and chargers

Lithium ion batteries offer some exciting RC possibilities, especially in the area of slow and park flyers. Until now, the biggest problem has been charging them—Li-ion cells require careful handling, and standard Ni-Cd chargers just aren't sensitive enough. Batteries America's new battery pack and dedicated charger take all the guesswork out of recharging Li-ion cells. The BP-Li8412 battery pack is a 2-cell, 8.4V, 1200mAh unit that weighs just 3 ounces. It features a maximum discharge rate of 2.5 to 3 amps and can produce flight times of 30 minutes in a "Lite Stik" or similar model.

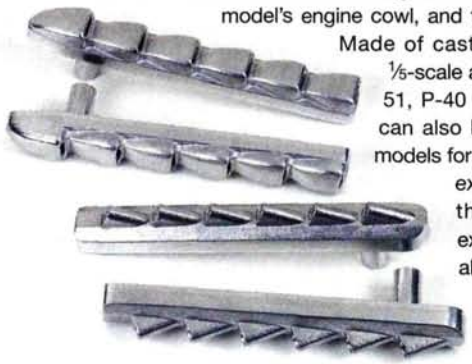
Two versions of chargers are offered for use with the pack—the 110V AC wall charger shown here and another that uses a 12V DC power source through a standard car cigarette-lighter adapter. A two-color LED indicates the charging status: red for charge in progress and green for charge complete. The battery pack and one charger cost $29.95 each and are available as a package for $59.95.

Batteries America, 2211-D Parview Rd., Middleton, WI 53562; (800) 308-4805; fax (608) 831-1082; www.batteriesamerica.com; ehyost@chorus.net.

J'TEC

Scale Exhaust Stacks

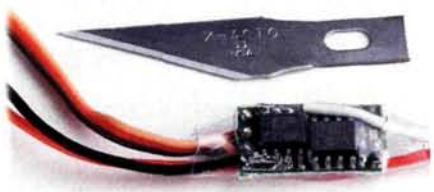
The last thing a scale modeler wants to do is to cut a hole in his beautiful airplane so he can attach a non-scale muffler. Well, cheer up, all you diehards. These functional scale exhaust stacks are designed to be mounted externally on the model's engine cowl, and they look just like the real thing. Made of cast aluminum, they are ideal for ⅕-scale and larger fighters such as the P-51, P-40 and Supermarine Spitfire. They can also be used with many large sport models for that "I mean business" look! The exhaust stacks are connected to the engine with flexible metal exhaust pipes and a small header, also available from J'Tec.



J'Tec Model Engine Accessories, 660 Pacific Ave., Oxnard, CA 93030; (805) 487-0355; www.jtecrc.com.

CASTLE CREATIONS

Pixie-7P Programmable Micro ESC



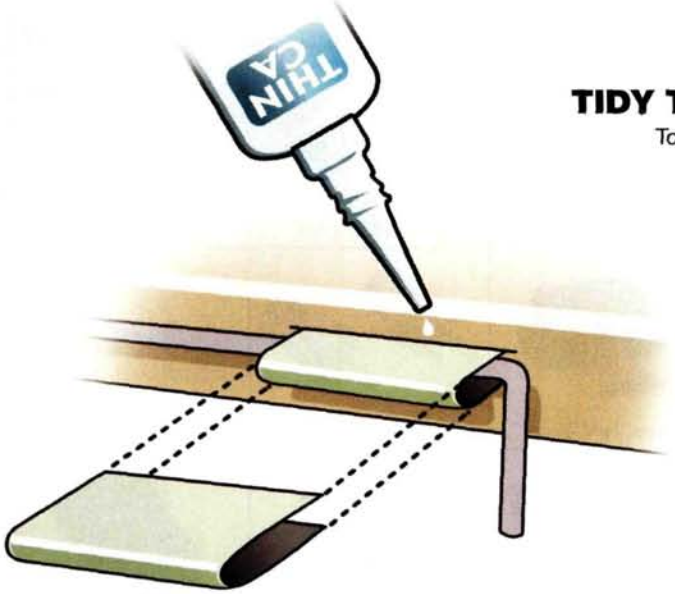
This updated version of the popular Pixie-7 speed control retains all familiar features of the original and offers several programmable functions. The user can now set the low-voltage cutoff warning fo from no cutoff up to 7 volts, making it usable with lithium batteries. It can be programmed for a hard cutoff with reset or a motor pulse to indicate a low battery charge and can also be set with fixed-throttle or auto-calibrating endpoints. All programming functions are set using the onboard LED and the transmitter's throttle stick. The settings are stored in permanent memory, so you don't have to reset the Pixie-7P unless yo want to modify the settings.

The 7P operates on from 3 to 18 cells (with BEC up to 8 cells), has a 7/ continuous rating and low-torque "soft start." It weighs only 0.15 ounc with wires. Astonishingly, the programmable unit costs just $34.95—same as the original unit!

Castle Creations, 18773 W. 117th St., Olathe, KS 66061; (913) 438-6325; fax (913) 438-1394; www.castlecreations.com.

READERS'
TIPS & TRICKS
WITH ILLUSTRATIONS BY DAVID BAKER

SEND IN YOUR IDEAS. ***Model Airplane News*** **will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Readers' Tip & Tricks." Send a rough sketch to** ***Model Airplane News*****, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.**



TIDY TORQUE RODS

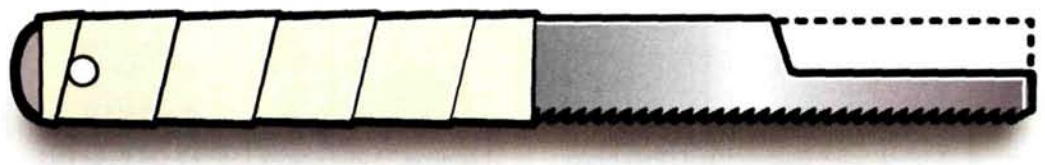
To reduce slop in an aileron torque rod that does not have built-in bearings, cut slots in the trailing edge of the wing above and below the rod. Then, take a piece of CA hinge material and insert one end into each slot to form a U-shaped support for the rod, and carefully apply thin CA. With the rod held securely, all linkage movement is translated into aileron deflection.

Scott Whatley
Orange Park, FL

HOMEMADE HANDSAW

Traditional hobby saws aren't particularly well-suited to cutting rounded openings through planking. You can make a better tool by taking a 32-tooth hacksaw blade and breaking it in half. Wrap heavy tape around approximately 3 inches of the blade to form a handle, then grind the broken end down to form a narrow blade. If you do this to both halves of the broken blade, you will have two saws; one will draw forward, and one will draw backward.

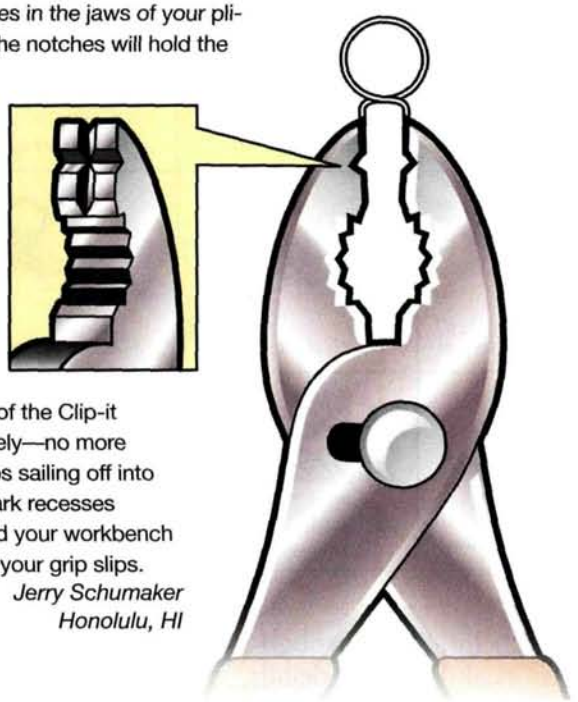
C. Milton Peacock
Finksburg, MD

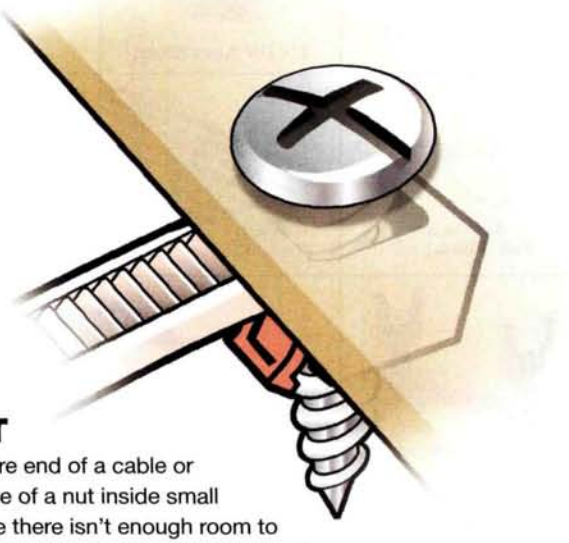


GET A CLIP

"Clip-it" hose clamps are really useful to secure your fuel lines, but because they're hard to grasp with fingers and standard pliers, they can be difficult to attach. Use a rotary tool or a small file to cut lengthwise and widthwise grooves in the jaws of your pliers. The notches will hold the arms of the Clip-it securely—no more clamps sailing off into the dark recesses behind your workbench when your grip slips.

Jerry Schumaker
Honolulu, HI

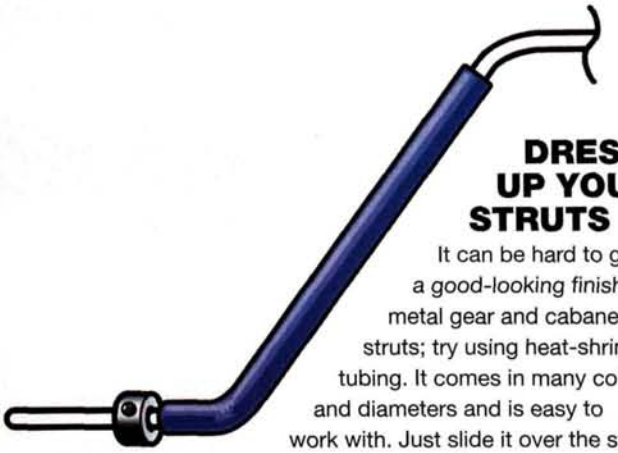




ZIP NUT

Use the square end of a cable or zip-tie in place of a nut inside small models where there isn't enough room to tighten a conventional fastener. Simply put the square end where the nut would go, using the long flat part of the tie as a handle to position it. Then thread a sheet-metal screw into it (the tab inside the square end will engage the screw's threads). When everything is tight, trim the flat end so it fits inside your model. You may want to leave a little of the zip-tie's end so you have something t grab if you need to remove the fastener later.

Richard J. Kastn
Dayton, C



DRESS UP YOUR STRUTS

It can be hard to get a good-looking finish on metal gear and cabane struts; try using heat-shrink tubing. It comes in many colors and diameters and is easy to work with. Just slide it over the strut or gear wire and zap it with your heat gun. You get thicker, more realistic-looking wires and a better surface finish in one step.

Miguel E. Contreros
Mérida, Venezuela

GOING AROUND THE BEND

Does working with brass tubes get you bent out of shape? Replacement caster hardware for sliding screen doors, available from any home-improvement store, makes an easy and affordable tube-bending device. Clamp some vice-grips onto the plate next to the roller from the hardware kit to hold it, leaving a slot between the pliers and the roller to guide the tube. Then push the tube against the roller until you have the angle you need.

Wayne T. Herin
Stockton, CA

NO MORE SPILLS

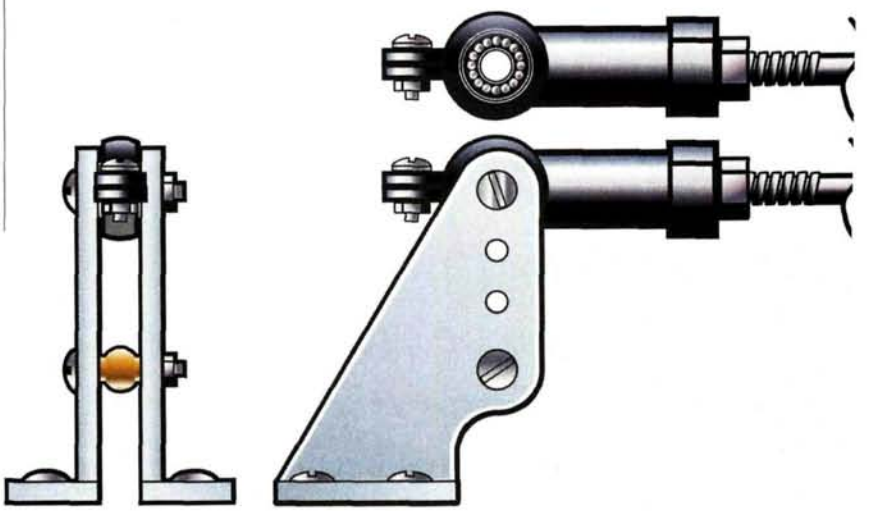
Few things are as frustrating as knocking over a bottle of glue—again!—right in the middle of the most crucial step in your model's construction. There is a way to avoid this, though: cut a hole in a piece of scrap foam that's the same shape as the bottom of the bottle, and push the bottle down into it (CA it if you like). This simple solution will ensure that your glue leaves the bottle only when and where you choose.

Jack Kahre
Thermopolis, WY

DOUBLE HORN

Here's a tip for eliminating slop, or end-play, on your giant-scale control surfaces and for strengthening the control linkage. Mount a JR ball-bearing clevis on the end of your control rod. Attach two large L-shaped control horns to your control surface, spaced just far enough apart for the ball bearing to fit between them. Use two case-hardened 4-40x½-inch bolts to secure the two horns together. One bolt goes through the clevis and the second goes through a ball-link ball to act as a spacer.

Doran Hiati
Grantsville, UT



PILOT PROJECTS

A look at what our readers are doing

SEND IN YOUR SNAPSHOTS. ***Model Airplane News*** **is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.**

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

WEATHER WOES

Dan Savage and his brother Daren of Rancho Santa Margarita, CA, designed and built this 86-inch-span model of a NASA Martin WB-57N high-altitude weather research aircraft. This electric ducted-fan model uses two WeMoTec Minifan 480 fan units, two Graupner Speed 480 BB race motors and 16, 1100mAh AA Ni-Cds wired to an AstroFlight ESC. It flies for 7 to 8 minutes. Dan designed this 5¼-pound beauty himself using DesignCAD 3D, and he and Daren built it out of balsa and lite-ply. The nacelles are fiberglass.

ROCKETEER BEE Z

Michael Boyles of Lebanon, OH, built this 57-inch-span Gee Bee Z from a Hobby Hangar kit. The aircraft weighs just 5¾ pounds, and a SuperTigre G 51 engine turns the prop. Coverite's 21st Century fabric covers the plane, and the decals are modeled after the Gee Bee Z featured in the movie, "The Rocketeer." Michael writes that the model gets a lot of attention at his flying club, both in the air and on the ground.

PORTER'S PORTER

Robert Porter of Quebec City, Canada, built this Pilatus Porter from an EZ kit. It has an 80-inch wingspan and weighs 12 pounds. The model is powered by an O.S. FS-91 Surpass II with a pump (because of the plane's long nose, Robert put the tank near the center of gravity). He uses a JR radio with eight servos for extras, such as a parachute drop box, flaps and landing gear with working suspension. Robert says he plans to tow sailplanes with his Porter.

GIANT ALBATROSS

Alan Yendle of Atlanta, GA, writes that looking at "Pilot Projects" in *Model Airplane News* motivates him. Apparently so, because he built this beautiful ¼-scale Albatross C-1 from scratch, using an enlarged D&B Sport and Scale plan. The top wingspan is 129 inches, and the bottom is 109 inches, for a total wing area of 3,960 inches. A Moki 2.10 with an IGS onboard glow system provides the power for this 39-pound aircraft. The model features stainless-steel rigging and a control column in the cockpit that turns with elevator and aileron input. The turret is mounted directly onto a ball bearing servo and traverses using the transmitter flap control knob.

AQUATIC DELIGHT

Rich Flinchbaugh of South Dennis, MA, says his Mitch Poling-designed Aqua Sport is great! It's equipped with Kircher foam floats, an 11x8 prop and a Castle Creations 35 speed control. A Magnetic Mayhem motor and 8 Sanyo 2000 cells power the Sport.

STUPENDOUS SPITFIRE

John Andrews built this Clark Industries Mark IX Spitfire for Jeff Kennemer of Campbell, CA. Powered by a Clark Merlin-II (two Sachs 3.2s coupled in-line), it swings a 27-inch diameter, 3-blade prop. The Spitfire's wingspan is 112 inches, and it weighs in at 50 pounds. A Futaba radio directs the aircraft. Chris Luvara took this photo on the Spitfire's first flight.

COUPED UP

David Weitzel of Greeley, CO, says he built this ¼-scale 90A Monocoupe while he was "cooped up" during the winter. He based the aircraft on a Tony Lombardo/Don Palumbo plan. This 'Coupe weighs 13½ pounds and has a 96-inch wingspan. Power comes from a Saito 150 engine, while a Futaba 8UAP provides the control. Covering consists of Super Coverite and Chevron paint. David writes that the flight characteristics are "about what you would expect from a big flat-bottom wing plane—flies great!"

SKI AND SKY

Jean Tardif of St. Jean, Canada, built this 96-inch-span Spook 1940 design. This old-timer is powered by a geared AstroFlight 60 turning a 20x12 Zinger prop. The model flies very well for 20 minutes with Sanyo 1700 cells. The aircraft is covered with Solartex and dope, and Jean writes, "It's a true conversion: wheels to skis!"

COOL CAT

Clifford Sauer of Saugerties, NY, built this Heritage RC kit of the F6F Hellcat. The 8-pound model is powered by a K&B 65 turning an 11x8 3-blade Master Airscrew prop. Other features include a scale exhaust, Robart retracts and MonoKote covering. The detailed cockpit is occupied by a cigar-toting, Smokin' Joe pilot. Clifford says the aircraft is fast but lands true and relatively slowly.

A new breed of small, light RC models takes the world by storm

by the staff of Model Airplane News

Backyard Revolution

Recent innovations in micro RC design and technology now allow us to fly more often and in more places, with less hassle and at less cost than ever before. From ARFs to scratch-built scale designs, everything we've come to love about conventional RC models is now possible in a smaller and lighter scale.

In this article, we share some of our favorite park, backyard and indoor RC models, as well as information about the RC gear and power systems that make them work. We also give you a first look at some small designs that will soon be on hobby store shelves.

Because so many micro RC products are available, we can present only an overview of the world of park-flyer—and smaller—RC airplanes in the pages that follow. Still, the variety may surprise you. And stay tuned as we continue to bring you the latest developments in this rapidly growing segment of the hobby.

GWS
Lite Stik

Perhaps the most well-known park and indoor ARF flyer, this foam-wing model has it all: it comes with a motor, gearbox and prop, takes one evening to assemble and is a good flyer. It's also very inexpensive—only $20!

With the included geared 180 GWS motor and 10x4.7 prop, the 6.6-ounce, 38-inch-span Lite Stik is stable and quite docile; for even better performance, try a GWS prop with greater pitch and smaller diameter. Add a faster gear ratio, and go pylon racing indoors! The Lite Stik's aerodynamic design lends itself to experimentation: we've seen Lite Stik canards, bombers, twins—your imagination is the only limit. You'll simply need a 3-channel radio, an ESC, batteries and two microservos to fly this model.

SIMPROP/HOBBY LOBBY

Pfalz D III Biplane slow flyer

Slow flyers can make great scale models, too. Just look at this little Pfalz D III bipe imported by Hobby Lobby. It has 341 square inches of wing area, but its wingspan is just 36 inches, so it can be flown pretty much anywhere. The Pfalz can be bought alone for $99 or as a complete set that includes a radio, a drive system, a charger and a battery for just $349.

ARF Hawker Hurricane and Me-109 from Hobby Lobby. Rumor has it that a Spitfire is close at hand.

Backyard Pilot

When I was 11 years old, my grandparents installed a shuffleboard in their backyard. To me, however, this structure was far more than a mere object of recreational whimsy—it was the perfect mini airport. From that moment on, I daydreamed of having an RC model that I could land at that mini airport. Although my mission for suitable, shuffleboard-size aircraft was quickly dashed—models of the '60s needed to be flown at standard-size RC model fields—my dream has finally become a reality. Today, we can build—or assemble, in the case of an ARF—an RC model and pretty much go outside to fly it. Large backyards, parking lots, ball fields and yes, even shuffleboard courts can be airfields for small, electric-powered models. And that's with virtually any kind of plane: trainer, sport, aerobatic and scale. You name it, this new, small world of RC has it in any form you desire, whether kit, ARF, or scratch-built.

I see this new form of tiny RC modeling blooming in literally every direction. You can get a complete kit and motor for as little as 20 bucks! When the laws of supply and demand start to take effect, you know a market has truly arrived. I think the best part, by far, of all of this park-flyer/slow-flyer "happening" is that it embraces experienced and novice modelers. With the incredibly docile characteristics of some designs, the benefits to the newcomer are overwhelmingly obvious, and that's a very healthy thing for our hobby. These backyard flyers could revolutionize the hobby industry by bringing thousands of new modelers into the fold. Conversely, guys who have been flying way longer than I have are just as swept up in the craze. Let me give you a perfect example: at the recent WRAM show in White Plains, NY, I took my good friend Nick Ziroli over to see Robbe's soon-to-be-introduced slow-flyer Fieseler Storch ARF. Nick was as excited as an 11-year-old; in fact, he has called me twice about the project. Just wait till you see some of the awesome designs the scale buffs are working on. Nick is just completing a slow-flyer version of the famous Wright flyer that's truly a miniature work of art.This slow-flyer/park-flyer phenomenon has the potential to bring new blood and veteran experience together like never before. And that is surely a beautiful thing and great news for our hobby. At least, that is the way I see it.

As for me, I'll continue to share information about new kits, ARFs, scratch-built projects from guys like Nick, radios, motors and other power equipment relating to this new and seemingly limitless frontier of the RC experience. I can tell you right now, one recurring topic will be creative flying sites. My first will be that shuffleboard "airport." I think that when I was 11, I knew that it would happen one day; I just didn't know that I would have a job writing about it. Life certainly is strange and wonderful.

—Chris Chianelli

The future is wide open

You've heard of the "expanding universe" theory? Well, this theory is fact when it refers to this new "universe of tiny planes." Whatever your pleasure, whether scale, sport, aerobatic, jets, biplanes, or fighters of either World War, it's to be found here in the blossoming world of park- and slow-flyer models. Check out these soon to be available mini-models—and this is only the beginning!

Robbe Fieseler Storch ARF

Robbe Bücker Jungmeister ARF

Yes, it's true! Backyard glider towing is a reality.

Great Planes CAP 232 ARF

WattAge F-22 ARF from Global Hobbies

Hobby Lobby's Sortakhoi SU-27.5 ARF. Wingo power unit and pusher-prop are used.

Robbe DR 2000 all-wood kit

R/C Direct/Ikarus

Blériot III park flyer

Slightly faster and more powerful than a stan dard slow flyer, the Blériot III park flyer come 95-percent built, so it takes almost no time at a to start flying. With a 50-inch wingspan, th model is rugged yet lightweight, and its 280-siz motor is powerful enough to fly it in light winds You can expect about 5 minutes of flight dura tion on a battery charge. Small parks, baseba fields, or backyards all make great flying sites f this floater. The model weighs about 11 ounce and has more than 470 square inches of wir area. Best of all, everything you'll need to fly th model (including a Hitec Focus 3 micro rad with 2 HS81 servos) can be purchased for und $310.

Rubber-powered RC

That's right! The Science Olympiad (SO) i micro RC indoor flyer, and it weighs only grams! Powered by a 14-inch loop of ⅛-inch rubber, the 19.7-inch-span SO has a recei that weighs only 1 gram and is powered b cells taken from a 12V Duracell battery. A B magnetic actuator controls the rudder. T model is built out of balsa and is covered v Japanese tissue.

Hangar 9

Fokker Eindecker

by Chris Chianelli

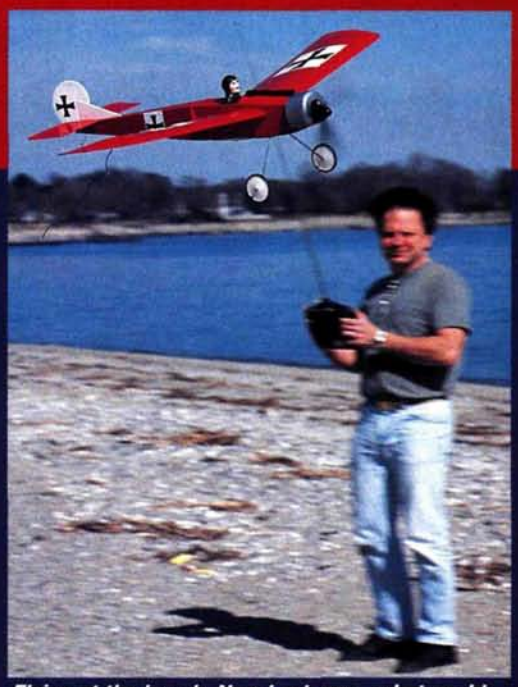
Hangar 9's Eindecker exemplifies the level of sophistication that the tiny-plane market has reached. This little balsa ARF has very high-quality materials and finish, and its excellent parts fit and complete package make it extremely easy to assemble. The 18-page instruction manual is quite thorough; assembly time is estimated at 8 to 10 hours—very conservative. I finished my Eindecker in about 4 hours, and that was with my favorite "Star Trek" movie playing on my shop TV! Everything is in the box except the radio, speed controller and battery. Machine gun, wheels, pushrods, 280 motor and reduction gear drive (mounted) are all included. There's even a pre-painted pilot complete with facial wrinkles.

The Hangar 9 Fokker is one of the most complete park-flyer packages on the market. Other than radio, speed controller and battery, everything is included—even a painted pilot!

This is JR's new park-flyer dedicated radio called the Quattro Lite. It includes the R610M 6-channel micro receiver and two NES-241 microservos for a street price of about $125.

All components are park-flyer specific, giving a finished flying weight of 14 to 16 ounces. For example, the vintage wheel hubs are hollow. When you hold the wheels up to the light, you can see an internal spoke structure. Two problem areas I noted are the cockpit/hatch hold-down system and unequal wing-panel washout. The hook-and-loop material that is used for the hatch hold-down is too loose. The hatch never came off, but it wobbled around quite a bit. The hatch needs to be held more tightly to the wing's top.

As for the wing panels, one had washout; the other had none. Once the wing panels had been joined, however, I was able to quickly twist equal amounts of washout into each wingtip using a heat gun on the film-covered wings. Other than these two criticisms, it was a pleasant and fun process to assemble the Fokker.



Flying at the beach. Now I ask you—what could possibly be better?

Every component of the Hangar 9 Eindecker is designed with light weight in mind. This hollow vintage wheel is a perfect example.

FLYING

With JR's new Quattro Lite micro system, a GWS GS400 speed controller and a 600mAh, 7-cell Ni-Cd pack installed, wing loading topped out at 8.3 ounces per square foot. At this wing loading, and on a flat-bottom airfoil to boot, great slow-flight characteristics came as no surprise. Not only can you barnstorm around in small areas with this little red Fokker, but you can also take off and land on many hard, even surfaces—including short, cropped grass. With the stock drive system, climb is quite good; however, loops do require a shallow dive before entry.

The instructions claim 10-minute flight duration with a 600mAh battery pack. The best I was able to achieve was 6½ minutes, but I only used Ni-Cd packs. I'm sure the 10-minute mark could easily be realized with nickel-metal-hydride cells. Flying the Eindecker low and slow for the Nikon caused no adrenaline whatsoever to flow—even in a light breeze. Although the wing will stall, as is the case with almost any conventional wing, the little vintage bird instills a lot of confidence in its pilot. It's a joy in the air, for sure.

CONCLUSION

The phenomenon of park flying certainly has the potential to inject much fun into our great hobby. I know it has for me, and I've been RC'ing for 30 years now. With its fine quality, ease of assembly, great flight characteristics and scale appeal, Hangar 9's Eindecker and other products like it will permit modelers of all skill levels to quickly experience the joy that this new, park-flying "thing" has to offer.

Left: the Fokker's construction will be very popular with the "I love wooden models" crowd. Note: pushrods and geared motor-drive system come already installed.

SPECIFICATIONS

Wingspan: 37¾ in.
Weight: 14 to 16 oz.
Wing loading: 7.8 to 7.9 oz./sq. ft.
Radio: 3-channel (rudder, elevator, throttle)
Battery: 7-cell 600mAh
Speed control: 5A minimum
Street price: $130

Motors, Batteries and Control Systems

by Tom Atwood

A world of new gear is now available for micro RC applications: motors, props, batteries, receivers, servos, electronic speed controls, connectors and more. "Plug and play" RC equipment that will be familiar to any RC modeler is offered in every price range.

At one time, electric power was associated with minimal flight times, but that is now history. Across the entire category of park and backyard flyers, power-on flight times of 10 to12 minutes (and 15-plus minutes using nickel-metal-hydride [NiMH] cells) are quite common. For the really diminutive aircraft that weigh only a few ounces (e.g., those that are typically flown in still air or indoors in gymnasiums), power-on flight times of 4 to 6 minutes are common. And with lithium cells, flight times of an hour or more are easy to achieve.

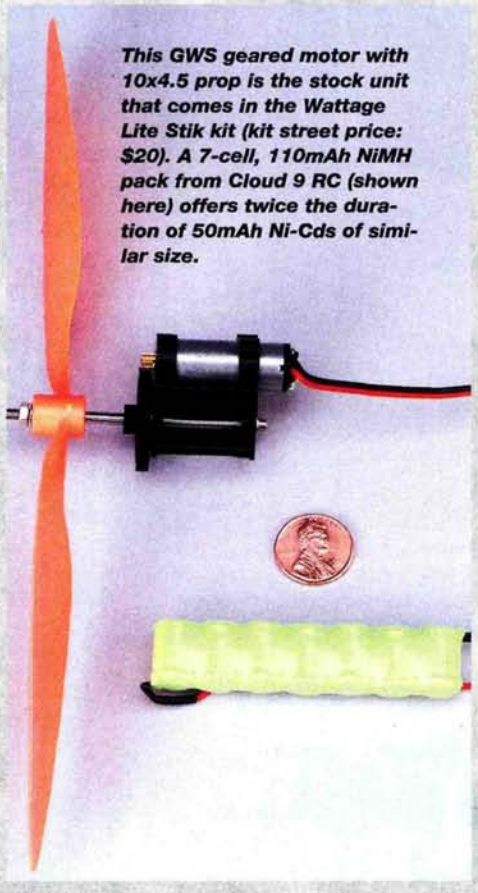
• **Motors.** There is an amazing variety of new direct-drive and geared motors that are purpose-designed to power slow flyers. Conventional brush motors range from Speed 400s at the larger end to geared 280 motors and still smaller units such as the very popular GWS motors, the AstroFlight Firefly Micro and European imports such as the WES-Technik DC1717 and DC5-2.4. AstroFlight even offers a diminutive .010 brushless motor. There is a motor in every price range for every application.

Props are offered by a variety of manufacturers for the wealth of direct- and geared-motor systems now being marketed. For a look at some of the latest additions, which include higher-pitch props for park flyers and still smaller props for the smallest RC models, see John Worth's March 2000 "Cloud 9" column, featured in the *RC MicroFlight* highlights at www.rcmicroflight.com.

• **Batteries.** The batteries that power micro flyers range from 500 to 600mAh nickel-cadmium (Ni-Cd) and nickel-metal-hydride (NiMH) cells for the larger park flyers down to tiny 50 and 100mAh cells for the smallest "plug and play" backyard and indoor aircraft. Batteries designed for the camera and cell-phone markets have also been incorporated into the micro RC battery arsenal. Rechargeable and single-use lithium cells offer extraordinary duration for smaller aircraft. Moreover, a variety of electronic speed controls (ESCs) are now available with battery-eliminator circuits (BEC) that will power both the motor and the onboard RC gear.

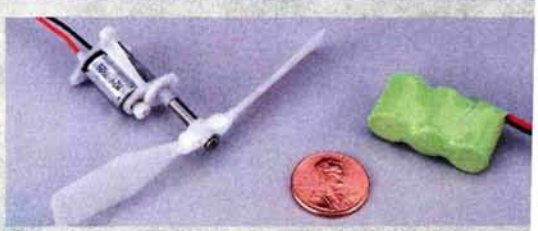
The range in battery size simply reflects the power requirements of models of various sizes. Smaller motors flying fully equipped, 3-channel aircraft that weigh less than 9 ounces may draw one tenth the power of larger park flyers—as little as ½ to 1 amp while cruising.

The PF-5, manufactured by Dave's Aircraft Works and distributed by Toddsmodels.com, is a 3-channel aircraft that weighs 4.2 ounces, ready to fly. The PF-5 features a WES-Technik DC5-2.4 motor spinning a 9x5 carbon-fiber prop. Eight 50mAh Ni-Cd cells provide a 4-minute flight with plenty of punch (the PF-5 will ROG in 10 feet). This plane uses a Sky Hooks & Rigging RX-7 Hybrid receiver/ESC and two Hitec HS-50 servos. Kit price: $65.

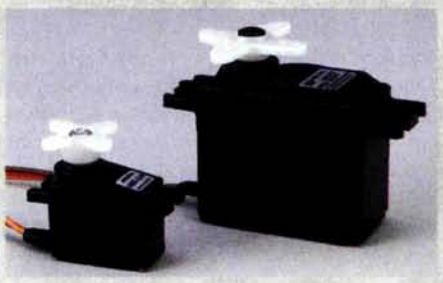


This GWS geared motor with 10x4.5 prop is the stock unit that comes in the Wattage Lite Stik kit (kit street price: $20). A 7-cell, 110mAh NiMH pack from Cloud 9 RC (shown here) offers twice the duration of 50mAh Ni-Cds of similar size.

The Speed 400 motor often powers the larger park flyers. The SR 500mAh Ni-Cd pack offers excellent power, duration and longevity over many charges and discharges.



The diminutive KP-00 motor and 3-inch-diameter folding prop, available from Cloud 9 RC, are shown next to 3, 110mAh NiMH cells. This drive system offers run times of more than 5 minutes.



The JR 241 sub microservo weighs 0.32 ounce, or about one fifth the weight of the standard JR 537 servo on the right; the sub micro offers a substantial 17 oz.-in. of torque.

Choose the batteries suited to your application, and you'll have no trouble flying your small model for periods of power-on flight that last from several minutes to well over an hour.

Consider the advantages of the tiny 100mAh NiMH cells that debuted in the hobby over the last year. At 3.5 grams each, these cells weigh the same as 50mAh Ni-Cds. Micro RC expert Don Srull charged these NiMH cells at 0.3 amp and found that their performance was very close to that of 110mAh Ni-Cds (see the April 2000 issue of *RC MicroFlight*). Because they are the same size and weight as 50mAh Ni-Cds, the new 100mAh NiMH cells offer twice the energy density of Ni-Cds.

Lithium cells offer spellbinding performance in the smallest aircraft and come in both rechargeable and "single-use" versions. For details on Tadiran rechargeable lithium-metal cells, see Tom McCann's article in the February 2001 issue of *RC MicroFlight*.

• **Radio systems.** Hitec and JR are the first of the larger radio companies to develop dedicated systems for the micro-flight arena. Hitec offers the Focus 3 SS FM system that comes with a 3-channel transmitter with Ni-Cd batteries and a wall charger, two HS-55 microservos and a Feather receiver. This package costs only about $105. Hitec's Feather Flight Pack, which includes four HS-55 servos, a Feather receiver, micro-switch harness, a charging jack and an airborne 270mAh battery, costs only about $70. JR offers its own dedicated system, the J-Line Quattro Lite, which comes with a 4-channel transmitter, JR 610M small receiver and two 241 microservos for $125. For a glimpse of the great many sub-micro radio systems now available, see the "Receiver Survey" included in the *RC MicroFlight* highlights at www.rcmicroflight.com.

Micro Mustang

Designed by Dave Robelen, the Micro Mustang just might be the ultimate backyard fighter. This diminutive Mustang has an 18-inch wingspan, slightly more than 50 square inches of wing area and weighs only 2.2 ounces. The model can be built from the *RC MicroFlight* plan using ⅛-, 1/16- and 1/32-inch sheet balsa and is covered with fine-grade tissue on the open areas. The finish on the sheeted sections is spray sealer and clear Krylon paint. The 3-channel model uses Sky Hooks & Rigging's Pro receiver, two WES-Technik servos and an FMA Direct Mini 5 ESC. In the nose is a DC5-2.4 motor using a 4.2:1 gear reduction to turn a 5.2x5.2 prop. The drive battery is a 5-cell, 50mAh Ni-Cd pack that provides about 4 minutes of flying time.

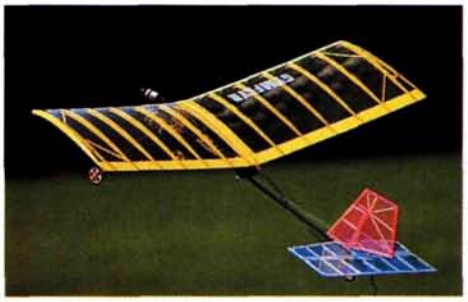
Micro Pond Baby

Do you have a nice-size duck pond near your home? Well, how about a neat little seaplane like the Pond Baby? Another design by Dave Robelen, this is an interesting and simple-to-build diversion from the more common land-based designs. With a span of only 20 inches and a weight of 80 grams (2.82 ounces), the Pond Baby must be the lightest seaplane ever built. In typical seaplane fashion, the DC5-2.4 motor is attached to a pylon high above the wing and has a 4.2:1 reduction to turn a 5¼-inch prop. Note the dummy model airplane engine covering the electric motor; it's made of balsa. The plan is available from *RC MicroFlight*.

Horizon Hobby

Firebird

This super-simple, easy-to-fly model is intended for the first-time modeler and is a great first taste of RC flight. The Firebird's simplicity plus its unique control linkage virtually guarantee a successful, fun-filled first flight. The combo kit (less than $100) comes with the airplane, transmitter, charger and battery pack; the radio gear and motor are already installed. If you've never flown before, you'll appreciate the short demo video that's included with the kit.



Anything RC

GymFlyer

As its name implies, this lightweight RC model can easily fly inside a school's gymnasium. Reminiscent of early dimestore, stick-and-tissue free-flight designs, the $47.95 GymFlyer uses a DC1717 motor and a 9V NiMH battery pack for power. The 34-inch-span wing is covered with plastic food wrap, and the body stick is made of carbon fiber. Weighing only 4.8 ounces, the model uses a Hitec 555 receiver, an FMA SC05 speed control and two Hitec HS-50 servos for control.

Hobby Lobby

Miss Bohemia

Hobby Lobby is a leader in the ARF slow-flyer market, and the Miss Bohemia is a good reason why. The all-wood airframe is sturdy and light, and the flat-bottom wing makes it nice and stable. Don't let that fool you, though; the flight surfaces have plenty of deflection, which gives the Miss B. razor-sharp reflexes. It will fly for more than 12 minutes on a 7-cell, 350mAh pack if you keep the geared 280 and 9x7 prop spinning at around ½ throttle, which is plenty of power. Assembly is simple, and the kit comes with everything but the ESC, radio and battery for $109.

Dumas

PZL Polish Fighter conversion

If you like to experiment, try converting an existing rubber-powered free-flight model to micro RC. The 30-inch-span PZL P11c Polish high-wing fighter from Dumas Products ($42.95) is a good place to start. The stick-and-tissue model was converted by Tom Hunt and is powered by a geared 4:1 Titanic Airlines/Modelair-Tech GD-280 motor and an APC 9x6 slow-flyer prop. Control comes from two FMA S-60 servos, an FMA Quantum receiver and an FMA Mini-5 ESC. The PZL weighs only 10 ounces ready to fly, including its 8-cell, 270mAh NiMH drive battery.

Want more information?

The following is a small sample of the kinds of articles published in *RC MicroFlight*. They have been chosen by the editors as a starting point for your perusal of the website, where you will find many additional articles ranging from downloadable plans to how-to's to kit and product reviews.

Batteries

- Cloud 9 RC's "Quad-Time" NiMH Cell, by Don Srull
- A New Rechargeable Cell for Micro Flyers, by Don Srull
- Tech Review: Caring for NiMH Cells, by Tom Hunt
- Tadiran Lithium cells; Tadiran Lithium-Metal Cells, by Tom McCann

Construction

- Convert a Rubber-Powered Free-Flight to Electric RC, by Tom Hunt
- Easy modifications for even better Lite Stick performance, by Bob Wilder
- Sheet Materials for Micro RC, by Jef Raskin
- Building the Mini: A Carbon-Fiber and Film Design, by Russ Pribanic

Micro RC Gear

- Cloud 9: The Magic of Modules, by John Worth
- GWS Cored Motors, by Tom McCann
- Tech Review: Astro 010 Brushless Motor, by Tom Hunt
- Guide to Micro RC Receivers, by Bob Aberle

Free web trial offer!

If you are not a subscriber to *RC MicroFlight*, point your browser to *www.rcmicroflight.com/freetrial* for information on how to obtain a user ID for our free web trial offer. It will be available for two weeks beginning April 23, 2001. If you have an interest in subscribing to this print and online newsletter, please see page 157.

Northeast Sailplane Products

Virus V

This unique V-tail monoplane is one of many new park flyers from Northeast Sailplane Products. It is an almost-ready-to-fly (ARF) kit and can be assembled in only a few hours. It has a 42½-inch wingspan and weighs a bit more than 13 ounces. Priced at $109.95, the kit comes with all the hardware and the motor/prop combo. Power comes from a geared MiG 280 motor with a 4:1 reduction. It uses an 8-cell, 600mAh NiMH pack. Radio gear consists of a GWS Pico receiver, a Sirius GFS ESC and two Expert SL-200 sub-microservos.

FUN WITH INDOOR RC

by Bob Wilder

Many of you have flown all types of indoor rubber-powered models, from peanut scale to high-performance endurance models. On the outdoor model-flying scene, there are those who enjoy breathtaking aerobatics, and some who get a thrill out of piloting a racer around a pylon at very high speeds. By combining many types of model aviation, you can come up with an enjoyable new approach to modeling—better known as indoor RC.

I realize that a few diehard modelers have been flying indoor models since before Orville and Wilbur were born, but only in recent years have most us who love model airplanes taken the hobby indoors, where it's even more enjoyable. For example, the weather indoors is always great. You may fly into a wall, but you never have a flyaway. If one of those lightweight, slow-flying indoor models bears down on you, it probably won't even knock off your hat! They are very quiet and don't spray out oily fuels. You won't get sunburned, and you won't have to pick sand burrs out of your socks. You won't tear your pants climbing over a barbed-wire fence to chase a free-flight.

Nor does it take much time to construct one of these jewels. They don't cost much, and they require only a small space for storage, thus permitting you to have several diverse models.

Interest in designing, building and flying indoor RC models is at an all-time high. Last year, we had the first-ever sanctioned AMA contest for indoor RC. We flew five events: scale, aerobatics, weight-lifting, pylon racing and endurance. New indoor events will include helicopters, blimps, towplanes releasing gliders, combat, bomb drops, carrier landings and balloon-busting. Although a few modeling events are experiencing declines in interest, indoor RC is the fastest-growing activity in the model airplane industry today. Many model-supply manufacturers have realized this, and they are jumping on the bandwagon by producing new, small, lightweight equipment for indoor RC.

Recently, the very popular Lite Stik models were introduced (see photo on page 32). We took the opportunity to have some indoor pylon races. "You ain't seen nuthin'" until you've seen six of these simple little models buzz around the pylons together. Yes, we had a few midairs, but above all, we had lots of laughs.

Pylon racing is popular with the indoor guys, but there is interest in many other events, too. There's a lot of room to experiment and evaluate the many new products such as motors, radios, servos, speed controllers, props, gears and batteries. Manufacturers are doing a great job of supplying the hobby with more innovative supplies, equipment and models for indoor RC. If any of this interests you, and you are considering building something, the best and simplest advice I can give you is "Build it light—very light." Come join the fun!

Joining NIRAC

Thanks to the tireless efforts of Bob Wilder and his associates in Texas, an exciting new special-interest group has emerged: the National Indoor Remote-Controlled Aircraft Council (NIRAC). Officially recognized by the Academy of Model Aeronautics (AMA), NIRAC encompasses both radio-controlled models and those guided by infrared light. NIRAC is helping to develop a number of events, including indoor aerobatics, scale, pylon racing, endurance, weight-lifting, blimps, helicopters and more. The annual membership fee is $12.

For more information on joining NIRAC or on the NIRAC fun fly and competition, contact Bob Wilder, 1005 Hidden Oaks Ct., Colleyville, TX 76034; (817) 498-6316; rjwmaw5@flash.net.

Open Indoor RC Fun Fly and Competition at the SWAC Trade Show!

The National Indoor Remote-Controlled Aircraft Counsel (NIRAC) is sponsoring an indoor fun fly and competition on May 18 and 19 in Arlington, TX. It will be held in conjunction with the second annual Southwestern Aero-modeling Conference (SWAC) trade show. Flying will take place between 9 a.m. and 5 p.m. at the convention center in Arlington. In addition to the fun fly,

competitions will take place in indoor aerobatics, scale, stock and modified Lite Stik pylon racing, as well as in other classes.

The modified Lite Stik class requires the use of original GWS parts; biplane, canard, V-tail and "racer" modifications are allowed, as are non-standard gears. Entrants must use GWS wings, tail, stick body, motor (STED, DX, or DXC), prop, spinner and wheels. Other components are optional. Wing, tail and body can be reshaped, and multiple wings and tails are allowed. A maximum of 6, 120mAh cells may be used.

For more information on the NIRAC fun fly and competition, contact Bob Wilder (see sidebar, "Joining NIRAC"). For general information on the SWAC trade show, contact Sandy Frank at 105 N. Brazos St., Weatherford, TX 76086-3207; phone/fax (817) 599-7131; sfrank69@airmail.net.

Backyard Pilot Source Guide

Airwise Intl.
P. O. Box 215, Prattsville, NY 12468; (518) 229-3648; sales@airwiseinternational.com; www.airwiseinternational.com.
■ ARFs, kits, ESCs, motors

Anything RC
Chris Hansen, 1822 E. 40th Ave., Spokane, WA 99203; (509) 747-2526; chris@anythingr-c.com, or info@anythingr-c.com.
Kits, batteries, props, motors,
■ RC gear

APC Props
Distributed by Landing Products, 1222 Harter Ave., Woodland, CA 95776; (530) 661-0399; www.apcprop.com.
■ Props

AstroFlight Inc.,
13311 Beach Ave., Marina del Rey, CA 90292; (310) 821-6242; www.astroflight.com.
■ Motors, chargers, ESCs, gearboxes

Aveox Electric Flight Systems
31324 Via Colinas, #103, Westlake Village, CA 91362; (818) 597-8915; www.aveox.com.
■ Kits, motors, servos, ESCs

Balsa Products
122 Jansen Ave., Iselin, NJ 08830-2601; (732) 634-6131; www.balsapr.com.
[distributor of GWS and others]
■ Kits, RC gear, motors, props, batteries, chargers

Batteries America
2211-D Parview Rd., Middleton, WI 53562; (800) 308-4805; www.batteriesamerica.com.
■ Batteries, chargers

Bill Brown
c/o David Brown, P.O. Box 77, Pine Grove Mills, PA 16868; (814) 238-9554.
■ CO_2 motors

Bill Griggs Models
3137 Whitelaw Rd., Canastota, NY 13032; (315) 697-8152; www.aiusa.com/bgriggs.
■ ARFs, kits, motors, RC gear

Castle Creations
(913) 438-6325; pdelcast@idir.net., www.castlerc.com.
■ ESCs, gearboxes

Cloud 9 RC
John Worth, 4326 Andes Dr., Fairfax, VA 22030; (703) 273-0607; jwc9@mindspring.com; www.rcmicroflight.com/vendors.
■ Electric and CO_2 motors, props, ESCs, gearboxes, RC gear

Composite Model Works (CMW)
218 N. Peg St., Ridgecrest, CA 93555; (760) 375-8705 or (877) 335-8705; www.compositemodelworks.com.
■ Kits, ESCs, motors, batteries, chargers, RC gear

Dave Thacker
7046 Harshmanville Rd., Huber Heights, OH 45424; davthacker@aol.com; www.radicalrc.com.
■ ARFs, kits, servos, batteries

Dave's Aircraft Works
34455 Camino El Molino, Capistrano Beach, CA 92624; (949) 248-2773; www.davesaircraftworks.com.
■ Kits

David Lewis
4027 Rocky River 26, Cleveland, OH 44135-1147; (216) 251-2517; dlewis@homefly.com; www.homefly.com.
■ Kits, ESCs, motors, props, gearboxes, batteries, chargers

Dumas Products
909-A E. 17th St., Tucson, AZ 85719; (520) 623-3742; fax (520) 620-1329; for catalog: (800) 458-2828, ext. 600; dumas@azstarnet.com.
■ ARFs, kits

Dymond Modelsport USA
683 W. Main St., Oshkosh, WI 54901; (920) 303-1100; dymondrc@execpc.com; www.rc-dymond.com.
■ ARFs, motors, props, ESCs, batteries, chargers, RC gear

Dynamics Unlimited
2814 Cold Springs Rd., Baldwinsville, NY 13027; (315) 434-1225; du@tweny.rr.com; www.slowfly.com.
■ RC gear

Electric Jet Factory
8929 N. Ferber Ct., Tucson, AZ 85742; (520) 579-5609; www.electricjetfactory.com.
■ Kits, batteries, motors, ESCs, ducted-fan units

FMA Direct
9607 Dr. Perry Rd., Unit 109, Ijamsville, MD 21754; (800) 343-2934; www.fmadirect.com.
■ Kits, batteries, motors, ESCs, chargers, props

Fritz Mueller
4117 Searcy St., Columbus, GA 31907; (706) 561-3345.
■ CO_2 motors

Global Hobby Distributors
18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452; www.globalhobby.com.
■ ARFs, kits, batteries, motors, ESCs, chargers, props

Great Planes Model Distributors
2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; www.greatplanes.com.
■ ARFs, kits, batteries, motors, ESCs, chargers, props

GWS (Grand Wing Servo)
Distributed by Balsa Products Engineering and Hobby People; gws@grandwing.com.
■ ARFs, ESCs, RC gear

Hangar 9
Distributed by Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.
■ ARFs, kits, batteries, motors, props, ESCs, chargers

Herr Engineering
1431 Chaffee Dr., Ste. 3, Titusville, FL 32780; (407) 264-2488; iflyherr@cris.com; www.iflyherr.com.
■ Kits, motors, ESCs, batteries

HiLine Inc.
P.O. Box 11558, Goldsboro, NC 27532; (919) 778-6653.
■ Motors, props, batteries

Hitec RCD Inc.
Glenn Merritt, 12115 Paine St., Poway, CA 92064; (858) 748-6948; www.hitecrcd.com.
■ ARFs, ESCs, RC gear

Hobby Club
(949) 240-4626; www.hobbyclub.com.
■ ARFs, kits, motors, ESCs, props, RC gear

Hobby Lobby Intl.
5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; www.hobby-lobby.com.
■ ARFs, kits, motors, ESCs, props

Hobby People
18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (800) 854-8471; www.hobbypeople.net.
■ ARFs, kits, batteries, motors, props, ESCs, chargers

Horizon Hobby Inc.
4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.
■ ARFs, kits, batteries, motors, props, ESCs, chargers

JR
4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.
■ RC gear, transmitters

Kenway Micro Flight
P.O. Box 889, Hackettstown, NJ 07840; (908) 850-9571.
■ Motors, gearboxes, props

Kreigh's Models
P.O. Box 962, Mojave, CA 93502; www.flyifo.com.
Kits, ARFs, ESCs, motors,
■ Gearboxes, props, batteries, chargers, RC gear

Maxx Products
815 Oakwood Rd., Unit D, Lake Zurich, IL 60047; (800) 416-6299; (847) 438-2233; www.maxxprod.com.
■ ARFs, ESCs, motors, batteries, chargers, servos

Megatech
Distributed by America's Hobby Center, P.O. Box 32, North Bergen, NJ 07047-0032; www.megatechrc.com.
■ ARFs, servos

Mike's Tiny Motors (MTM)
Mike@mtm-int.com.
■ ESCs, motors, batteries

Modelair-Tech
P.O. Box 1467, Lake Grove, NY 11755-0898; (516) 981-0372; www.modelairtech.com.
■ Kits

Multiplex USA
14751 Calvert St., Van Nuys, CA 91411; (818) 785-2401; www.multiplexrc.com.
■ ARFs, kits, ESCs, motors, RC gear

New Creations R/C Inc.
P.O. Box 496, Willis, TX 77378; (936) 856-4630; www.newcreations-rc.com.
■ ARFs, kits

Northeast Sailplane Products
948 Hercules Dr., Ste. 12, Colchester, VT 05446; (802) 655-7700; www.nesail.com.
■ ARFs, kits, ESCs, motors, props, batteries, chargers, radios, RC gear

Peck-Polymers
P.O. Box 710399, Santee, CA 92072; (619) 448-1818; www.peck-polymers.com.
■ Kits, motors, props

RC-Direct
4444 Convoy Ct., San Diego, CA 92111; (858) 277-4531; www.rc-direct.com.
■ ESCs, servos, receivers

RC MicroFlight
(800) 243-6685; www.rcmicroflight.com.

RCS Technik
22 Dartmouth Park Ave., London, England NW5 1JN; 44-171-267-9049; www.rcscale.co.uk.
■ Kits, ESCs, motors, props, RC gear, radios, batteries, chargers

Sirius Electronics
12470 SW 1st St., Ste. 203, Beaverton, OR 97005; (800) 532-0092; www.siriuselectronics.com.
■ ESCs, chargers

Sky Hooks & Rigging
2206 Towne Blvd., Oakville, Ontario, Canada L6H 5H4; (905) 257-2101; info@microrc.com; www.microrc.com.
■ Kits, ESCs, motors, props, RC gear, batteries, chargers

Tadiran
Distributed by David Lewis.
■ Lithium batteries

TNR Technical
301 Central Park Dr., Sanford, 32771; (800) 346-0601; www.batterystore.com.
■ Batteries

Todd's Models
Todd Long, P.O. Box 827, Snoqualmie, WA 98065; (425) 888-8530; todd@toddsmodels.com; www.toddsmodels.com.
■ Kits, ESCs, motors, props, gear, batteries, chargers

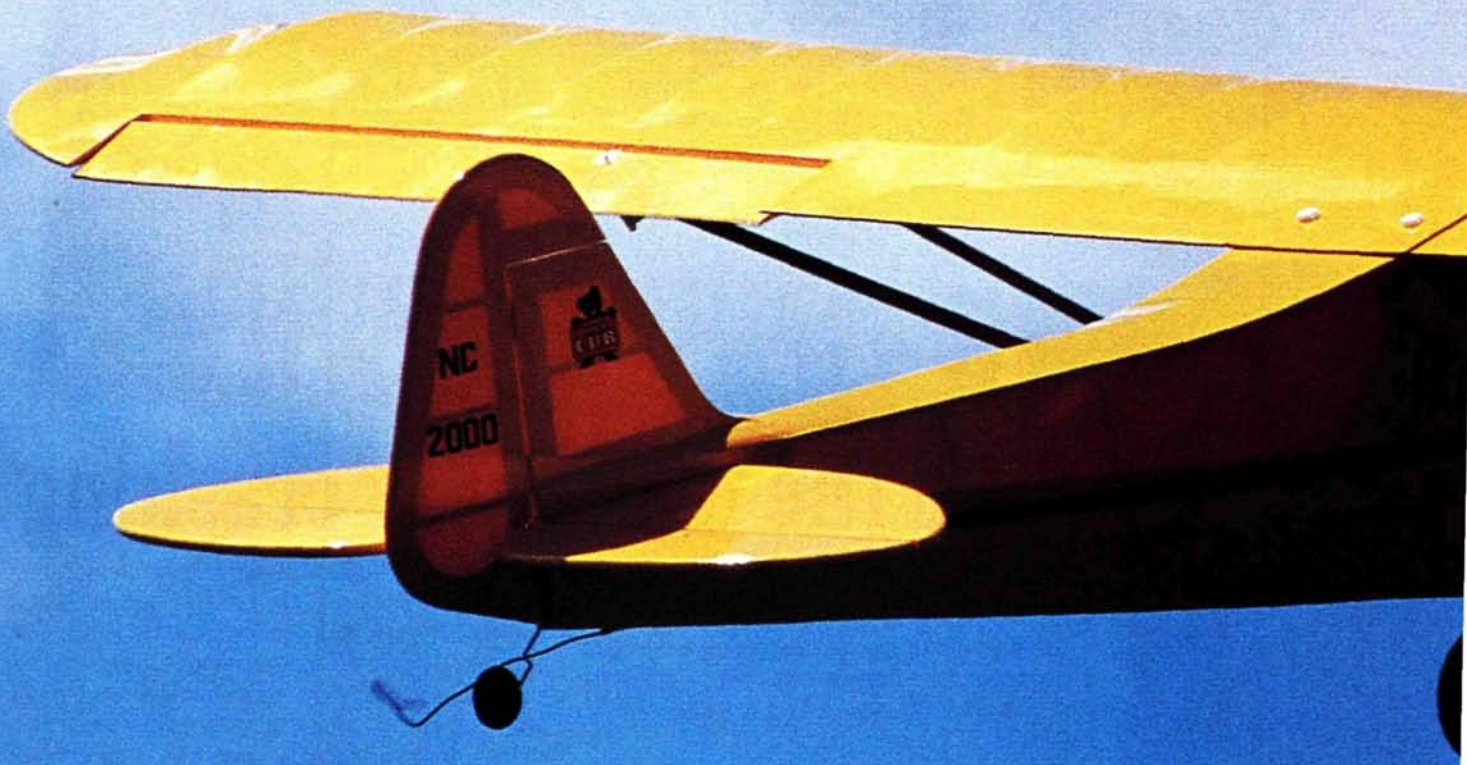
VL Products
294421 Beverly Glen Cir., #255, Los Angeles, CA 90077 (310) 271-4805.
■ Electric motors, gearboxes

WES-Technik
Distributed by David Lewis; Todd's Models; and Sky Hook Rigging.
■ Props, motors, gearboxes

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

THUNDER TIGER Piper J3 Cub

A new take on a classic favorite



by Keith Palmer

The Piper J3 Cub has long been a favorite airplane of modelers, whether in free-flight, control line, or radio-controlled form. Nothing else flies like a Cub, and practically every model manufacturer has a Cub of some sort in its inventory of airplanes. Thunder Tiger's latest is the 82-inch, IMAA-legal Piper J3 Cub, but make no mistake—this isn't just another Cub. As an ARF, it's quick to build, ar absolute blast to fly and—as you would expect from Thunde Tiger—this model is of excellent quality from nose to tail What you might not expect is the level of scale detail tha this ARF incorporates; with a little dressing up, this big Cu can get you into the winners' circle at your next scale contes

KIT CONTENTS

The kit was delivered to me at the flying field, so I decided to open it there to get impressions from my flying buddies to add to my own. We opened the box and were greeted by a bright yellow Cub with all of the components nicely wrapped in plastic to protect against shipping damage. I inspected the contents and was pleased to find that only a radio, engine and glue were needed to complete the airplane. The scale-looking landing gear is prebuilt and chrome-plated, and the wing struts are made from hard wood that has been airfoiled and notched to accept the mounting plates. We were all impressed with the covering job, as well; there was no sign of dust or debris between the covering and the airframe as I've seen with some other ARFs, and everything fit together nicely. If we'd had some CA and epoxy on hand, I think we could have built it at the field.

CONSTRUCTION

The kit includes a very nice 23-page instru tion book that is filled with photograph After thumbing through it, I estimated that could have the Cub in the air in fewer tha 10 hours, so I set off to work. The first step to hinge the ailerons to the wings with th supplied pinned hinges. The hinge slots a already cut into all of the movable surface so this step took just 45 minutes, and 30 that was drying time. The next step is to c

SPECIFICATIONS

Model: Piper J3 Cub

Manufacturer: Thunder Tiger

Type: sport-scale

Wingspan: 82.7 in.

Fuselage length: 48 in.

Wing area: 850 sq. in.

Weight: 6.5 to 7.5 lb.

Engine: .46 to .61 2-stroke; .50 to .91 4-stroke

Engine used: Thunder Tiger F-54S 4-stroke

Radio required: 4-channel with 5 servos

Radio used: Hitec Prism 7 with HS 422 servos

List price: $199.99

Features: all balsa and lite-ply construction, precovered with Goldberg Ultracote; clear canopy and side windows, scale Cub wheels, all necessary hardware, pushrods, motor mounts and fuel tank included.

Comments: fine flight characteristics—as expected of a Cub. Exceptional quality—as expected from Thunder Tiger. Scale details are a cut above the average ARF.

Hits

- Excellent workmanship on the construction and covering of the airframe.
- Very easy to assemble.
- A blast to fly.

Misses

- The fuel tank did not fit into the stock firewall opening, and the wing center needed to be resized to fit the windscreen.

PHOTOS BY WALTER SIDAS

away the covering material from the servo bays and the aileron wire exit holes. The aileron servos are mounted on their sides, and the grommets fit between the pre-installed hardwood mounting blocks. Screw the nylon strap into place over the servo to hold it securely. Extension wires are needed for the servo leads, and the kit supplies heat-shrink tubing to put over the connections. Use a piece of piano wire to fish the extension wires through the wing. Screw down the servo hatch covers with the servo output arms extending through the slots in the covers. Then screw the supplied control horns into place on the ailerons and use a short pushrod wire to connect the aileron to the servos.

The wing halves are held together by a joiner that is composed of a piece of aluminum sandwiched between two pieces of plywood. The first step is to glue the ply to

FLIGHT PERFORMANCE

• TAKEOFF & LANDING

I ran two tankfuls of fuel through the Thunder Tiger F-54S before the first flight. This is a very powerful engine, and I was quite pleased that it ran almost out of the box. I made very slight adjustments to the carburetor to achieve a proper transition from low to high throttle.

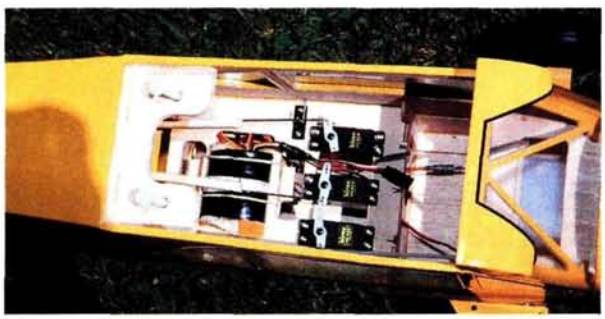
I taxied my Cub out to the runway, and before I could open the throttle even halfway, my Cub was airborne and climbing out straight as an arrow. The airplane required no trim changes, and I was very impressed at how fast the airplane was; it actually flies too fast to be scale. I flew the Cub around to get used to its handling characteristics, and I found that ½ throttle was just the right speed. After a few low-speed passes, I set the Cub up for its first landing. I turned it into the wind and chopped the throttle, and the Cub set down for a perfect 3-point landing. This plane doesn't need long landing approaches, and it shows no tendency to stall.

• LOW-SPEED PERFORMANCE

This is where the Cub is in its element. Loops and stall turns are what the Cub does best. Loops require full throttle to get the Cub over the top, and stall turns are very crisp in either direction when full rudder is supplied. Touch-and-go's are a blast to do; this model is so stable that you can set it down on one wheel and rock it to the other wheel using a little bit of aileron throw.

• HIGH-SPEED PERFORMANCE

With the F-54S up front, the Cub is way over-powered. At full throttle, the Cub will fly inverted and do some very nice rolls, but it will climb quite a bit in the turns. Unlike with some other Cubs, there is no need to have the rudder coupled to the ailerons in this plane.



Top: Thunder Tiger's Cub kit is nicely appointed, and the quality is excellent. Of particular interest are the chrome landing gear and the wing struts; the latter come airfoiled and notched to accept the mounting plates. Bottom: the fuselage is big and easily accessible from several angles. The plywood servo tray has openings for a switch, three servos and the receiver. Note the pre-installed blind nuts for the wing hold-down bolts. The pushrods come already built and threaded for the clevises. The kit includes the connectors I needed for my Hitec radio gear.

the aluminum piece using 30-minute epoxy and plenty of clamps. When the glue has dried, remove the clamps, draw a centerline on the joiner and dry-fit it into the spar box to make sure that it will go all the way into each wing half. When you're sure the fit is right, glue the joiner into one wing half and then the other, and join the halves as they come together using slow-curing epoxy. Hide the seam with the supplied yellow trim tape. Then glue the hardwood wing-bolt plate into place on the top of the trailing edge after removing the covering from where it will be glued. The holes for the wing bolts are already in the plate, so all that is left to do is to transfer the holes through the wing using the bolt plate as a guide. Two installed ¼-inch dowels position the front of the wing to the fuselage. The one problem I had with the wing was that the cutout in the wing leading-edge center was not wide enough to fit over the front of the fuselage windscreen. I had to sand about 1/32 inch off each side of the opening to make it fit. The ¼-20 blind mounting nuts are also pre-installed in the fuselage for the wing hold-down bolts. I was quite impressed with the alignment of the kit; everything lined up without any problems.

The fuselage is almost as simple as the wing to construct. First you need to remove the covering material from the openings where the stabilizer, fin and landing gear will go. The covering must also be removed from the pushrod exits. Use the supplied retainers and screws to hold the landing gear to the fuselage, and mount the scale wheels and landing-gear fairings to the landing gear just as the instructions describe.

Next, add the tail feathers. Start by joining the two elevators using the supplied wire joiner and thick CA. Next, hinge the elevators to the stabilizer using the supplied pinned hinges and 30-minute epoxy. With the wing bolted to the fuselage, I centered the stab in the fuselage and drew a line on each side of the stab so that I knew where to remove the covering. After making sure that the stab was parallel to the wing, I glued it in using 30-minute epoxy. I used the same procedure to mount the fin and rudder, except that the tailwheel wire must be glued into the rudder before hinging. I was very impressed with the fit of the stab and fin; the stab required no adjustment to make it parallel to the wing and the fin was 90 degrees to the stab without adjustment.

PIPER J3 CUB

With the control surfaces mounted, it is time to start working on power. To dampen vibration, place rubber spacers between the firewall and the beams when you screw the engine mount to the firewall. The mounting holes are already drilled into the firewall, and the blind nuts have already been installed. I assembled the fuel tank according to the instructions, but I had to enlarge the opening in the front bulkhead to allow the tank to pass through. I used some foam to hold the tank in place and then glued the throttle pushrod in the predrilled holes.

I chose to use the Thunder Tiger F-54S for my Cub. I screwed it to the mounts using the supplied screws at the location given for that engine—it was that easy. The next step was to install the radio. A plywood servo tray is pre-installed in the fuselage with openings to accommodate the switch, three servos and the receiver, with a rubber band to hold the receiver in place. After securing the servos, I connected the prebuilt pushrods to the output arms on the elevator and rudder servos. One end of each pushrod is threaded to accept a nylon clevis; the other end requires a Z-bend. An easy connector for the throttle servo is supplied and makes setup of the throttle a snap.

The cowl comes painted and includes score lines for cooling openings and head clearance. After you've opened all the cutouts, the cowl is held in place with three wood screws on each side. Dummy cylinders are provided for the right side of the cowl; use medium CA to attach them, then cut out the windscreen and side windows and secure them with 5-minute epoxy. Now attach the wing struts using the supplied hold-down plates and screws. The strut hold-down plates have to be bent 25 degrees so they are flush with the surface of the wings and the fuselage. The last step is to apply the supplied decals. Use masking tape on the wing and fuselage to act as a guide for positioning the decals.

Overall, the Thunder Tiger Piper J3 Cub is a first-class ARF. The airplane goes together very nicely and is built as well as most modelers would build their own airplanes from a kit. With the recommended 4-stroke engine up front, it has a very scale-like sound and is a real showstopper at the field. The Thunder Tiger Cub is one airplane that you'll never want to leave at home when you go flying.

Carl Goldberg Models, *4734 W. Chicago Ave. Chicago, IL 60651; (773) 626-9550; fax (773 626-9566; www.goldbergmodels.com.*
Hitec RCD Inc., *12115 Paine St., Poway, C 92064; (858) 748-6948; fax (858) 748-1767 www.hitecrcd.com.*
Thunder Tiger USA; *distributed by* ***Ace Hobb Distributors,*** *116 W. 19th St., P.O. Box 472 Higginsville, MO 64037; (660) 584-7121; fa (660) 584-7766.* ✦

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

by Jim Onorato

RC fun on land and sea, and in the air

I really enjoy float flying, so when I got the opportunity to review an ARF floatplane, no one had to twist my arm! The Ready (what more appropriate name can you give to an ARF?) is made almost entirely of molded ABS plastic and can be purchased one of two ways: as a stand-alone kit or with an optional set of floats (conventional trike gear is included in either case). The floats, which are also made of plastic, can also be purchased separately if you change your mind later on. The Ready is a high-wing trainer and is intended as a first floatplane. The plane is manufactured by ARC in Cremona, Italy, and is distributed by Falcon Trading Co.

ARC/FALCON TRADING CO. READY FLOATP

SPECIFICATIONS

Name: Ready (with floats)
Manufacturer: ARC (Cremona, Italy)
Distributor: Falcon Trading Co.
Type: High-wing trainer floatplane ARF
Wingspan: 61.8 in.
Length: 42.9 in.
Wing area: 605 sq. in.
Weight: 7 lb. (including floats)
Wing loading: 26.7 oz./sq. ft.
Radio req'd: 4-channel with four servos
Engine req'd: .40 to .45 2-stroke
Engine used: O.S. .40
Retail price: $149.95 (plane); $59.95 (floats); $220.95 (plane with floats)
Features: all-plastic ARF with everything included except the radio, engine, propeller and fuel tubing; one-piece molded fuselage; foam-core wing with ABS plast molded over it; hollow tail feathers; all co trol surfaces hinged in the mold; simulate ribs in tail feathers and ailerons for a scal like appearance; well-written instructio manual.
Comments: the ARC Ready on floats is good-looking sport plane that is easy assemble and fun to fly. Its unique a plastic construction makes it durable, a its flight characteristics make it a go

PHOTOS BY WALTER SIDAS AND JIM ONORATO

LANE

irst floatplane for beginners and experi-enced pilots.

HITS

- Excellent parts fit.
- Ease of assembly.
- Good step-by-step instruction manual.
- Superior water handling and flight performance.

MISSES

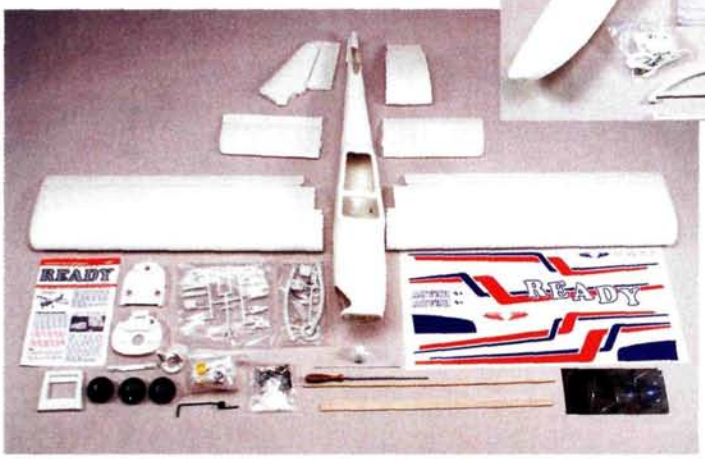
- Wing is attached with only a single bolt.

ARC/FALCON TRADING CO. READY FLOATPLANE

WHAT'S IN THE BOX

The Ready comes with just about everything you need except the engine, prop and radio equipment. Since it is molded white ABS plastic, it can be left unpainted and simply trimmed with the decals included in the kit—that's the route I took. The fuselage is molded in one piece and has only one bulkhead and the firewall, both of which are molded, fiberglass-reinforced nylon. The wing is foam-core with ABS plastic molded over it. The tail feathers are hollow, and all the control surfaces are hinged in the mold—a detail that saves a lot of time and effort. Simulated ribs are molded into the tail feathers and ailerons for a nice, scale-like appearance. Even the main landing gear (which is also used as a float strut) is molded plastic. The 32-page building instructions are written in four languages and include a number of photos to supplement the text. The instructions contain a numbered list of all the parts and reference them by number in both the text and the photos as they are used in assembly.

The Ready kit lives up to its name; all it needs to be flight-ready is an engine, prop and radio gear. The entire plane is ABS plastic, making for a rugged and easy-to-assemble model. The kit includes all the needed hardware, as well as conventional trike gear. Some of the small pieces are specified "right" or "left"; be sure you put them on the correct side.



Above: you can specify your kit with or without floats, or you can buy the floats separately later on. They are mounted on the main landing gear struts, supplemented by the additional supports you see here.

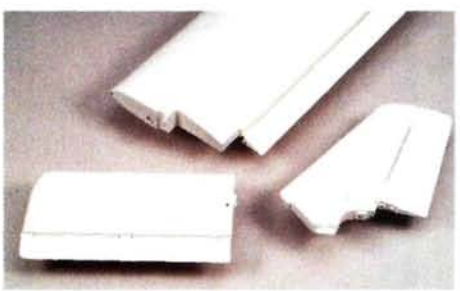
The floats are hollow, molded ABS plastic with rounded tops and V-bottoms. They have a spine running the length of the float on the top and a keel along the bottom—both of which give the floats rigidity. The keel, which is about ? inch wide, projects below the bottom of the float about ? inch to provide stability on the water. A second plastic strut and spreader bar is included with the floats to supplement the main gear strut. The floats come with separate multi-language instructions that include several good photos.

I must admit, when I saw that everything was made of plastic, I was a bit skeptical about how well this plane would fly, but I was soon very pleasantly surprised.

ASSEMBLY

Before you begin assembly, remove any small burrs that may have been left from the molding process. This is easily accomplished with a modeling knife and some 400-grit sandpaper. There are a number of small pieces that are designated as left- or right-side pieces, so be sure not to glue them in the wrong place. Also, be sure to follow the assembly sequence given in the instructions because many of the steps cannot be reversed.

Assembly begins with the wing, and unlike most ARFs, the Ready's wing panels are not joined with a spar joiner. Instead, the panels are epoxied into a 5?-inch plastic sleeve. Before I glued everything together, I trial-fitted the wing panels into the sleeve to be sure the two panels touched at the root. Then I roughed up the mating surfaces, applied a generous amount of 30-minute epoxy and slid the panels into the sleeve. I finished the wing by installing the aileron connecting rods, the aileron servo rails and the aileron servo. I used small self-tapping screws to hold the servo rails in place, even though the instructions said they weren't absolutely necessary. Better safe than sorry!



The control surfaces are prehinged and feature simulated ribs molded in to give a nice scale-like look.

The one-piece fuselage and its few parts are assembled next. After roughing up the edges of the firewall, I glued the motor-mount support ring and the front landing-gear mounting plate to the rear of the firewall and slid the assembly up against four small plastic pins previously installed through holes in the fuse sides. These pins made it easy to properly align the firewall and are a nice touch. I did not install the front landing gear or its support at this time because I chose to build my plane with floats instead of wheels. I glued the firewall in place with medium CA, which I applied all around the perimeter front and back.

The central bulkhead not only stiffens the middle of the fuse but also serves as the mounting point for the wing bolt, the servo tray and the main landing-gear legs (or, in my case, rear float struts). Before gluing the bulkhead into the fuse, you must drill a couple of holes and glue in a couple of small pieces—don't get these mixed up. A critical step here is installing the nut for the wing bolt. The nut is captured inside a plastic piece that gets glued into the bulkhead. You have to be sure to glue the nut retainer in place securely without getting any glue on the nut. Incidentally, the wing bolt is plastic with metric threads. If you prefer to use a standard threaded wing bolt, you have to install the proper nut now because it cannot be easily changed once installed. The single bolt that holds the wing in place isn't sufficient to prevent the wing from rotating, so I added a plywood mounting plate with blind nut at the rear of the wing saddle and used a second bolt at the trailing edge of the wing. Another thoughtful touch included is a long, Phillips-head screwdriver that allows you to access the landing-gear mounting screws through holes in the side of the fuse.

I used an O.S. .40 engine in the Ready, and I side-mounted it on the engine mount provided in the kit. An outline of the cutout required for the engine is already drawn on the fuse (another nice touch!). There is also a recess for the muffler molded into the fuse, so very little cutting is required. Since the muffler ended up pretty close to the fuse, I placed some self-stick aluminum foil in the recess to keep the muffler from melting the plastic.

The stab comes in two halves that ge epoxied over a hard balsa spar. The

FLIGHT PERFORMANCE

The first flights and the photo shoot were done on a clear, calm day from my boat on a nearby lake. I set the control throws at the recommended amounts, and the engine had been broken in enough to maintain a reliable idle. Now the fun could begin!

• TAKEOFF AND LANDING

With the engine at idle, I set the Ready in the water and pointed it in the direction that would keep the sun at my back. Since there was little wind, the water surface was quite flat, and the Ready sat perfectly level moving slowly away from the boat. As I increased the throttle, the plane got on step quickly and accelerated nicely in a perfectly straight line. The keels on the bottoms of the floats really do a good job keeping the Ready tracking straight. A little up-elevator is all it takes to get the plane airborne. The climbout is smooth and steady.

Landings are textbook easy. The Ready has a relatively shallow glide angle that allows for nice, long landing approaches and smooth touchdowns. While letting the engine set the rate of descent, I used the elevator to slow the plane until it just kissed the surface of the lake and skimmed along without bouncing. To me, that's the greatest thrill of float flying!

• GENERAL FLIGHT PERFORMANCE

The Ready has the inherent stability of a high-wing trainer and flies well at all speeds. I found it to be very responsive to the controls at full throttle and docile at the low end. When I forced a stall, it was gentle and straight ahead. I did not observe any bad tendencies at any speed.

• AEROBATICS

I was pleasantly surprised at how well the Ready performs basic aerobatic maneuvers. It will do graceful inside loops and nice axial rolls with proper aileron and elevator coordination. As with most floatplanes, however, the "pendulum effect" of the floats really makes it whip around during the last half of a roll. It will fly inverted with a fair amount of down-elevator, but inverted flight does seem somewhat awkward for a floatplane. Spin entry requires full deflection of all three control surfaces, but recovery is immediate when controls are neutralized. One thing that really surprised me was the Ready's ability to flat-spin and recover. If opposite aileron is applied once a spin is started, the plane will immediately begin to flat spin at a fairly high rate of speed. Granted, this is not very scale-like, but it sure is a lot of fun! Application of opposite rudder and more power is all that is required for quick recovery.

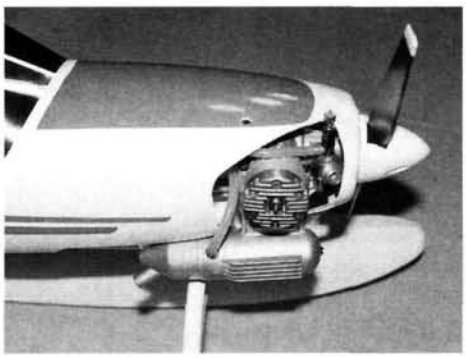
I really enjoyed flying this model and think it would make a great first floatplane for anyone interested in flying off water. Float flying certainly adds a new dimension to the hobby!

elevators are already attached with molded-in hinges. The tail feathers fit nicely in the openings molded into the fuse, and I glued them into place with CA.

At this point, the Ready is ready for the radio and controls. I used three standard servos in the fuse and mounted them in the servo tray just behind the central bulkhead. The rudder is controlled through a pull/-pull system that was made using the hardware supplied. The elevator pushrod is unique. It consists of a hardwood dowel and two plastic endcaps (ferrules) into which bolts are threaded from the inside and locked into place with a drop of CA. The endcaps are then glued to the dowel. I pinned them to the dowel, just to be safe. I connected the pushrod to the servo and elevator horn with clevises. I placed the receiver battery under the fuel tank and the receiver just in front of the central bulkhead. I wrapped both the receiver and the battery in foam and placed them in plastic bags to waterproof them.

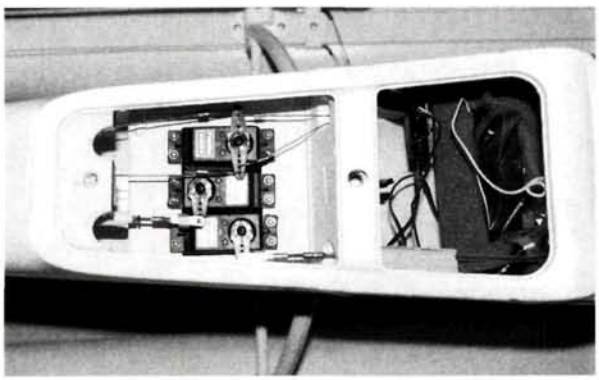
Not much work is required with the floats, so assembly went quickly. All the hardware was included, and the molded parts fit perfectly. Attach the forward strut to the front landing-gear mounting plate after the plate has been installed on the firewall. Then attach the floats to the struts using the spreader bars and fittings provided. The pull/pull cables used to operate the water rudder are routed through prebent brass-tube fittings mounted on the left float, then through small holes in the fuse and up to the rudder servo. This arrangement provides very positive control of the water rudder.

My plane looked good in white, so I elected not to paint it. Instead, I finished off the Ready using only the decals provided. Then the model was truly ready for water and air.



I fitted my Ready with an O.S. .40 engine on the side mount provided with the kit. An outline for the cutout is already drawn on the fuse, and there is a molded-in recess that fits the muffler.

Three standard servos fit in the servo tray behind the central bulkhead. The rudder is actuated by a pull/pull system, while the elevator pushrod uses a hardwood dowel with plastic endcaps that contain bolts to thread the clevises onto.



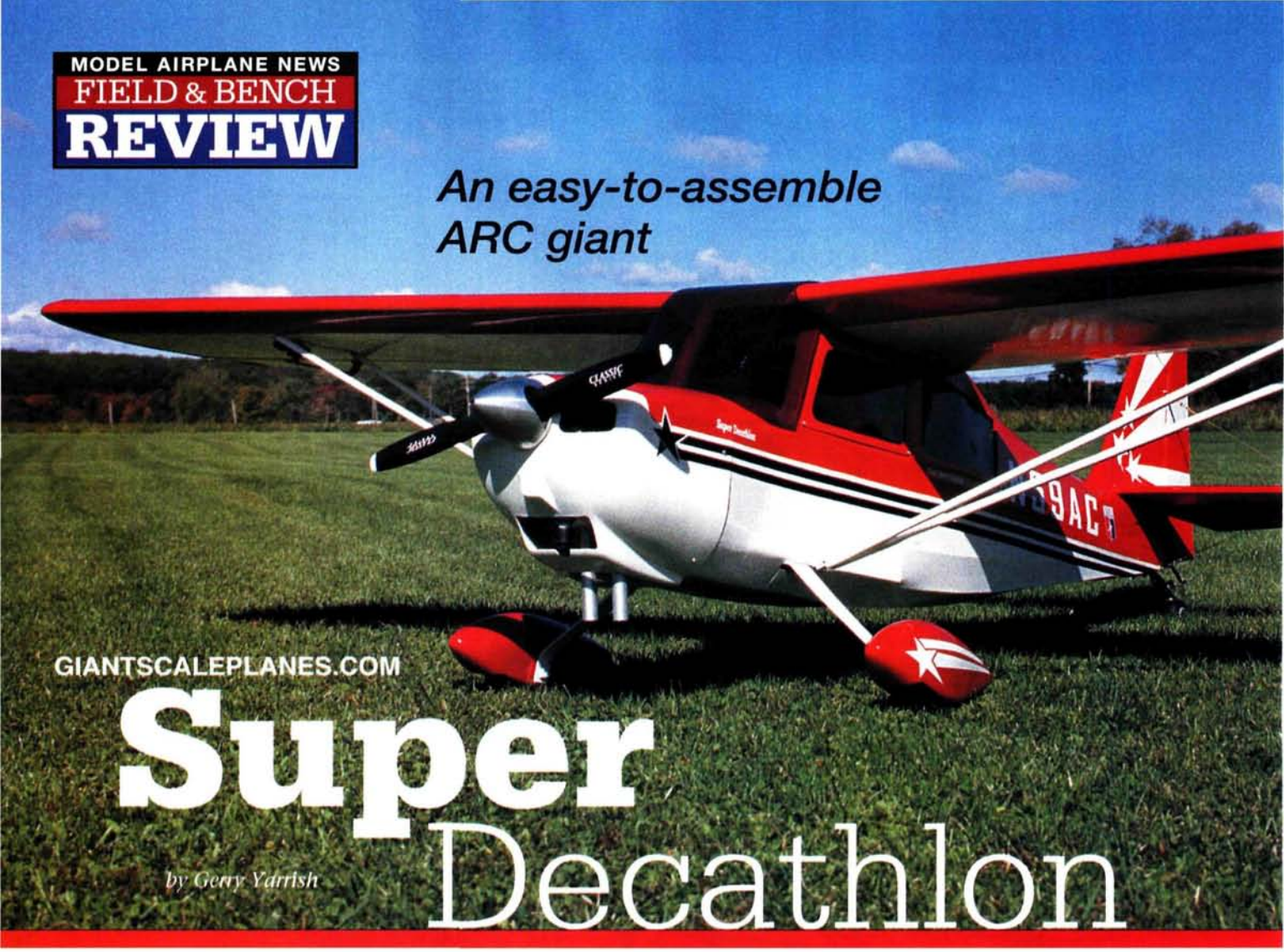
CONCLUSION

The Ready is a nice-looking, high-wing trainer that is extremely easy to assemble. It is well engineered, and its high-quality parts fit together perfectly. Even beginners should have no problem assembling this airplane. As you would expect of a high-wing trainer aircraft, the Ready is docile and easily controllable. When pushed, this plane is suprisingly aerobatic, though. Overall, this is a good choice as a first floatplane for pilots of any skill level.

***Falcon Trading Co.**, P.O. Box 753, Hobart, IN 46342; (219) 942-1134; fax (219) 942-5703. **O.S.**; distributed by **Great Planes Model Distributors Co.**, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.osengines.com.* ✈

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

An easy-to-assemble ARC giant



GIANTSCALEPLANES.COM

Super Decathlon

by Gerry Yarrish

The Super Decathlon is the second in a series of almost-ready-to-cover (ARC) giant-scale airplanes from Giantscaleplanes.com. Distributed by Hobbies and Helis, the kit comes with a jig-built fuselage featuring "engine-box" construction. This feature provides a strong mounting base for the engine, landing gear and wing-tube mount in a single structure. A gelcoated fiberglass cowl, wheel pants and wingtips are included, as are formed, wooden lift struts, aluminum landing gear and basic hardware. The wooden tail surfaces come built, with beveled leading edges (LEs) on all control surfaces and with the control-horn hard points installed. The wing is completely built and ready for hinging. The servo pockets and servo-lead channels have already been cut out. The wing's LE is shaped, and the wing-mount-tube socket is already installed. There is little else to do with this kit except to install your engine and radio, attach the control surfaces and cover the model with your favorite brand of film or cloth.

GSP kits now include printed instructions, and you can download photo-illustrated instructions in a PDF file from the company's website: www.giantscaleplanes.com.

KIT ASSEMBLY

Work begins with the fuselage and the installation of the landing gear and the tailwheel assembly (not included). I installed a Cirrus Ventures scale tailwheel unit, which meant I had to install two 6-32 blind nuts in the plywood mounting plate already glued in the tail. I also had to install a few pieces of balsa around the tailwheel leaf springs so the covering could be blended around the gear attachment. I then installed the main landing gear and marked the position for the wing-strut attachment brackets. The gear and brackets are bolted to a plywood plate in the bottom of the fuselage. This area is then covered with a balsa cover (already built and sanded for you).

The next step is to install the wing-mount tubes at the top of the cabin area. These are made of fiberglass and must be epoxied into place along with plywood doublers that strengthen their installation. It is best to temporarily install the wing panels and make sure that the root ribs align properly with the top of the cabin. Install the wing-attachment screws to hold the wings tightly against the fuselage side, then when they are in the correct position, epoxy the wing tubes into place and allow them to cure before you remove the wing panels.

At this point, it's a good idea to check the wing's dihedral and to fit the wing struts into place. In my kit, the prefabricated wood struts were too long and their ends did not align with the hardwood blocks already glued in the wing panels. To shorten the struts, I cut the extra-long aluminum attachment tabs at both ends of them. I then installed the struts with screws and blind nuts that I installed in the wooden attachment blocks. The kit includes formed wire jury struts, but I did not install them.

After the wing and struts were installed, I fitted and glued the tail surfaces to the fuselage. Slots are already cut for the surfaces, and it is very easy to epoxy them into place.

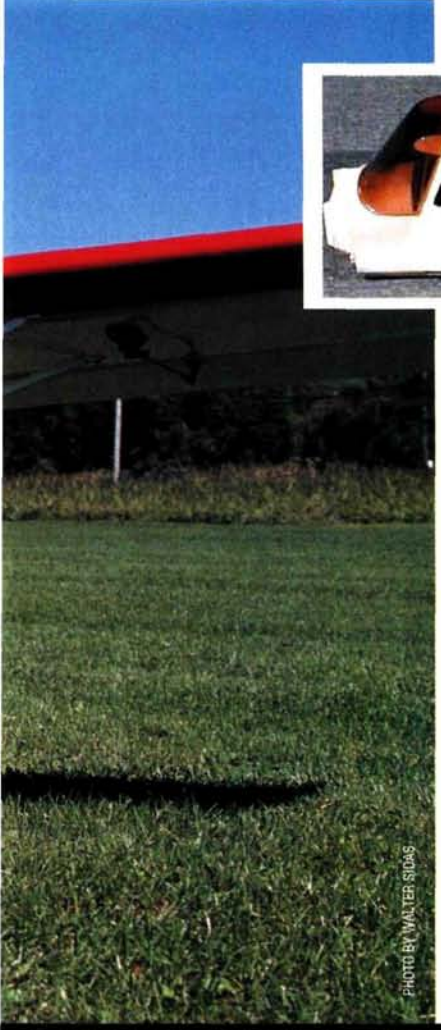
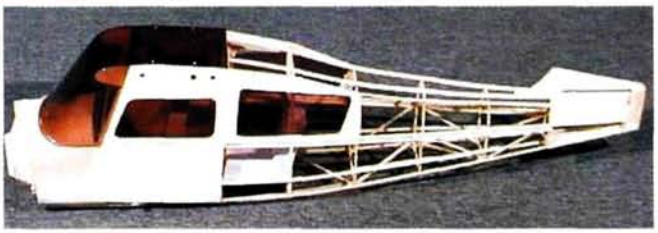
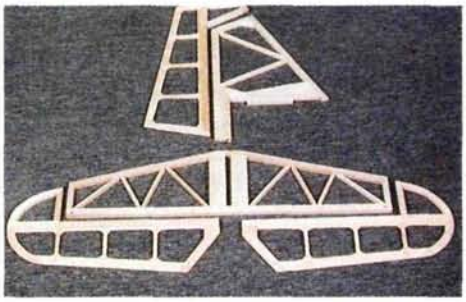


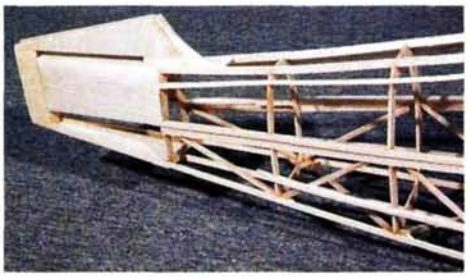
PHOTO BY WALTER SIDAS



The ARC Super Decathlon comes with its fuselage almost completely built. Only minor assembly is required.

Make sure that the horizontal stab aligns properly relative to the wing and that the vertical fin is 90 degrees to the stab. After the tail surfaces were in place, I installed the servos in the fuselage so I could make and install the rudder and elevator pushrods. I used two elevator servos and one for the rudder. Installation of the pushrods is much easier before the fuselage is covered. I also installed an internal tube so I could route the receiver antenna back to the tail. The last items to install in the tail are the bracing wires. These are not included in the kit, so I used a Sullivan tail-bracing kit that includes all the hardware and braided metal cable to support the surfaces. The brass tube "hard points" for the brace wire attachment brackets are already installed for you. I used giant-scale CA hinges for all the control surfaces.





Top: the tail surfaces are built up using balsa and lite-ply. The elevators and rudder are made from balsa and lite-ply laminations. The lite-ply is sandwiched top and bottom with balsa and already sanded to shape. Above: the tail surfaces slide easily into the slots at the tail of the fuselage. Very minor trimming was required for a perfect fit. Note the light-weight formers in the fuselage structure.

There is very little to do to the wing panels other than to install the aileron servos, hinge the ailerons and install the blind nuts for the wing-strut attachment. The wing tube sockets come already installed as do the attachment bolt's blind nuts in each root rib. The fiberglass wingtips come with flat molded flanges that are suppose to be glued to the wingtip rib after the wing is covered. For a more secure and better scale appearance, I sanded off the inner flange and slipped the tip over and around the tip rib then screwed the tips into place. For a better purchase for the tips, I glued ⅜-inch balsa to the tip ribs where the screws were located.

SPECIFICATIONS

Model: Super Decathlon
Type: almost ready to cover (ARC)
Manufacturer: Giantscaleplanes.com
Distributor: Hobbies and Helis Intl.
Wingspan: 96 in.
Length: 65 in.
Wing area: 1,398 sq. in.
Weight: 16 lb., 7 oz.
Wing loading: 27.1 oz./sq. ft.
Radio req'd: 4-channel (aileron, rudder, throttle and elevator)

Radio used: JR 8103 with NES-4721 servos
Engine req'd: 1.20 to 2ci 2-stroke
Engine used: Zenoah G-23
Prop used: Dynathrust 16x8
Price: $599

Comments: the GSP Super Decathlon is a well-made, easy-to-assemble, all-wood ARC. It looks good when finished, and the parts fit together very well. Powered by a G-23, the model is stable enough to be used as a giant-scale trainer.

Hits
- Lightweight construction.
- Excellent fiberglass parts.
- Highly prefabricated.

Misses
- None.

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

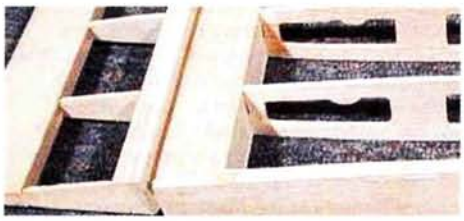
With the G-23 properly tuned and turning the 16x8 prop at about 8,000rpm, the Super Decathlon takes off and climbs out in a very scale-like manner. This is a large model that has no great abundance of power, but it gains altitude nicely and is not under-powered for sport flying. For landing, hold in about ¼ throttle until you have the field's threshold made, then begin to flare and pull back to idle. The airfoil is almost symmetrical, so there is not as much "float" after the flare as you might expect from a high-wing, cabin airplane.

• GENERAL FLIGHT CHARACTERISTICS

The Super Decathlon has very positive control, and the rudder is very effective. Coordinated rudder and ailerons are required for comfortable turns, and pitch control is more than adequate. Stalls are straightforward; if you've built your model straight, it should just fall nose-down after the break and resume flying after you release the stick and gain airspeed again. With a G-23 for power, the model could be used as a first giant-scale trainer.

• AEROBATICS

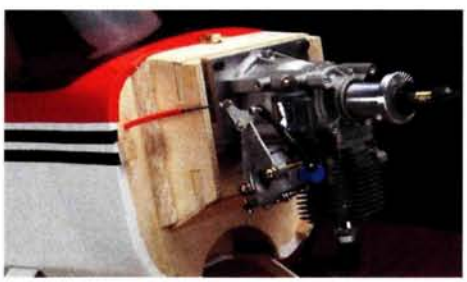
With the G-23 engine (1.37ci), the model is a low-energy aerobatic performer. That is to say, you need to use your model's energy wisely to make the maneuvers look good. A fairly brisk dive is needed to gain airspeed before you enter a loop or a roll. There is plenty of control throw for spins, but inverted flight requires full power and a bit of down-elevator. To really make the Decathlon perform, you will need a more powerful engine. Either a Zenoah G-38 or a Brison 3.2 would be my first and second choices, but as I said, these engines will require some modification to the firewall/engine-mount assembly.



The wing panels are already built and ready for installation. The ailerons also come built with their LEs beveled.

ENGINE INSTALLATION

The instructions suggest using a Zenoah G-23 gas engine to power the Super Decathlon. I tried several other engines—for example, a G-38, a U.S. 41 and a Brison 3.2—but these powerplants would have required cutting off the firewall and installing a new one farther back in the fuselage. The G-23 required only a ¼-inch plywood shim attached to the firewall face to place the engine in the correct location. To support the bellcrank for the throttle linkage, I used an aluminum bracket attached to the engine using the carb attachment bolts. I also used B.H. Hanson throttle arm fittings to connect the throttle linkage to the carburetor. B.H. Hanson also sells the hopped-up version of the G-23 that I used in the model. I used a 16x8 Dynathrust composite prop, a Slimline muffler and a Tru-Turn aluminum spinner to complete the powerplant setup.



The Zenoah G-23 gasoline engine is a perfect fit. If you decide to use a Zenoah G-38, you will have to cut off the existing firewall and install a new one farther aft between the fuselage sides.

FINAL ASSEMBLY

To complete the model, I covered it with red, white and black 21st Century fabric from Coverite. I started on the bottom of the fuselage and applied the white fabric in three pieces up to the second stringer from the bottom. I then applied the red to the sides and to the top to finish the covering job. The black pinstripes and the white starbursts are also made of 21st Century fabric and were cut to shape and ironed on top of the covering material. I also used 21st Century matching paint on the wingtips, wheel pants and the engine cowl. To install the smoke-colored windows and windshield, I used Pacer Technology Zap-a-dap-a-goo adhesive. The side windows are vacuum-formed and fit nicely into the window cutouts in the sides of the cabin.

To hold the wheel pants in position, I drilled a small hole in the landing gear next to the axle fitting. I then glued plywood plates to the inside of the wheel pants and installed blind nuts in them. The blind nuts line up with the hole in the landing gear, and I use a 4-40 screw and a few rubber washers to hold the pants in proper alignment with the gear. The rubber washers (you could also use large grommets) provide a little "give" and help prevent damage if the pants bump into something.

The fuel tank and receiver battery pack are just behind the firewall, and the throttle linkage is routed to the side of the firewall. The throttle servo is at the bottom of the cabin door opening for easy access. The kit comes with a built-to-fit cabin door and a window frame, both intended for hinging. I used a Nelson Hobby Specialties model piano hinge for the window and offset hinge-point hinges for the cabin door. In hindsight, the window didn't need to be hinged; it can be glued into place, as there is plenty of room for the installation of the wing-attachment bolts through the cabin door. I used a pair of Hobby Lobby latch pins to secure the door for flight.

The Giantscaleplanes.com Super Decathlon is a big, impressive model that's very easy to assemble and fly. If you are looking for a way to break the yellow Piper Cub habit, the Super Decathlon is an attractive alternative.

21st Century fabric; *distributed by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*
B.H. Hanson, *7380 S. Eastern Ave., Ste. 124-176, Las Vegas, NV 89123; (702) 436-4422; fax (702) 436-4416; www.bhhanson.com; bhhanson@brigadoon.com.*
Brison Aircraft, *12075 Denton Dr., Ste. 11, Dallas, TX 75234; (972) 241-9152; fax (972) 241-5065.*
Cirrus Ventures, *115 Hunter Ave., Fanwood, NJ 07023-1030; (908) 322-7221.*
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Dynathrust Props, *Box 91, Georgetown, TN 37336; (615) 476-2330.*
GiantScalePlanes.com; *distributed by* ***Hobbies and Helis Intl.,*** *201 S. 3rd St., Coopersburg, PA 18036; (610) 282-4811; fax (610) 282-4816; HHI@Fast.net.*
Hobby Lobby Intl., *5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; www.hobby-lobby.com.*
Nelson Hobby Specialties, *394 SW 211th Ave., Aloha, OR 97006; (503) 629-5277; fax (503) 645-1492.*
Pacer Technology, *9420 Santa Anita Ave., Rancho Cucamonga, CA 91730; (909) 987-0550; (800) 538-3091.*
Slimline Mfg., *P.O. Box 3295, Scottsdale, AZ 85271; (480) 946-9800; fax (480) 946-9802.*
Sullivan Products, *One North Haven St., Baltimore, MD 21224; (410) 732-3500; fax (410) 327-7443; www.sullivanproducts.com.*
Tru-Turn; *distributed by* ***Romco Mfg.,*** *P.O. Box 836, South Houston, TX 77587; (713) 943-1867; fax (713) 943-7630.*
Zenoah, *4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.* ✚

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

HOBBY LOBBY INTL.

Bebe Jodel

by Bob Aberle

Nostalgic low-wing park flyer

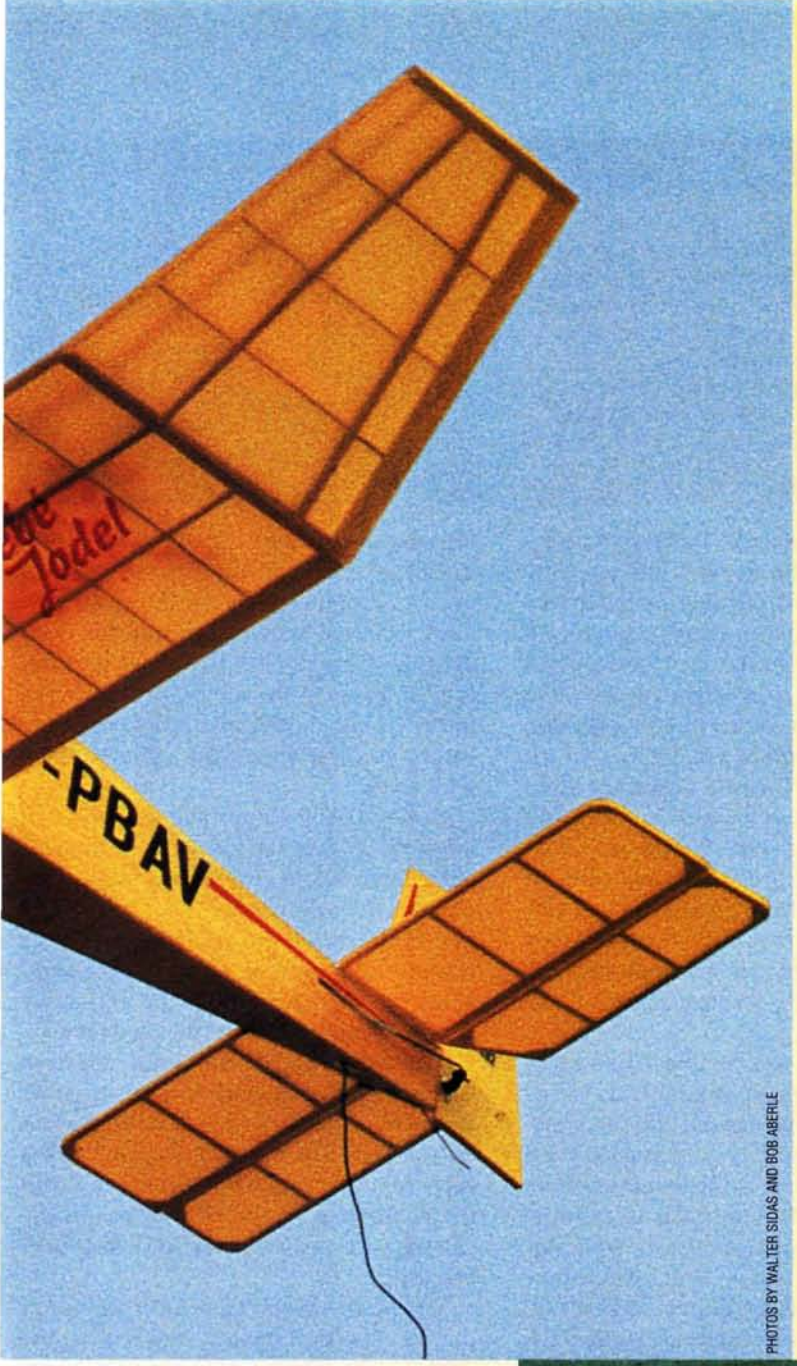
The Bebe Jodel needs no introduction to the world of full-size sport aviation. This popular little low-wing, open-cockpit aircraft, with the characteristic polyhedral wingtips and flat center section, has been modeled many times over the years. Now the folks at Hobby Lobby Intl. have imported a small, electric-powered Jodel that is intended for the slow- or parking-lot flier RC enthusiast. This ARF is manufactured by the Hacker Model Production Co. of the Czech Republic. It has a basic wooden open structure except for the sheet balsa fuselage, and the model is totally covered with Litespan, which makes it appear to have a tissue and dope finish.

What we are talking about here is a model with a 163-square-inch wing area and that weighs around 9 ounces with a 7-cell, 270mAh NiMH battery pack; that equates to a wing loading of only 8 ounces per square foot. The motor current is just a little over 4 amps, and at full throttle, it can provide 4-minute flight times. Reduced throttle settings produce very realistic flying speeds and can yield 6-minute flights. If you want more, you might try using slightly higher-capacity NiMH cells, but the associated weight increase will always be a trade-off. The model is set up to be flown with rudder, elevator and motor throttle control. Another servo can be added and with little extra effort, the Jodel can be configured with tip-panel ailerons, but I hardly think it's worth it, given the model's nice flight characteristics.

Although the original Jodel model was set up to use a geared Potensky POT2A motor, a direct-drive Speed 280 motor has recently been substituted in the interest of increased performance. An addendum to the instructions shows how to attach two small dowels to the firewall with braces. Then you simply attach the motor to the dowels using a couple of rubber bands. This may seem primitive, but it works, and I consider it one of the best ways to mount a small electric motor. It also helps save the motor shaft in the event of a crash, since the rubber bands will likely break first.

Hobby Lobby offers a Graupner Speed 280 direct-drive motor and a Gunther 5x4-inch white plastic prop and spinner for use with the Jodel. Rpm with a 7-cell pack are around 9,000, resulting in scale-like flying speeds with adequate duration. This is a perfect plane to fly in close quarters such as parking lots and soccer fields.

The kit includes a three-piece wing (two tip panels and a flat center panel). All that is required is to cement both tip panels to the center section at the proper polyhedral angle. A few words of caution regarding the main landing-gear wire: the initial kits employed very lightweight wire that could easily collapse on landing. Instructions supplied with the kit recommend that the modeler bend up new struts of a heavier



PHOTOS BY WALTER SIDAS AND BOB ABERLE

SPECIFICATIONS

Model: Bebe Jodel

Manufacturer: Hacker Model Production Co. (Czech Republic)

U.S. distributor: Hobby Lobby Intl. (catalog no. HCZ1209)

Type: electric semi-scale ARF

Wingspan: 31.5 in.

Wing area: 163 sq. in.

Weight: 9 oz. (with battery)

Wing loading: 8 oz./sq. ft.

Motor: Speed 280 direct drive

Prop: Gunther 5x4 white plastic

Speed control: Castle Creations Pixie-14 Lite ESC with BEC

Battery: Sanyo 7-cell 270mAh NiMH

Flight duration: 4 to 6 minutes

Radio req'd: 3-channel

Radio used: FMA Direct Quantum DC micro receiver, two Hitec HS-55 sub-microservos

Price: $79

Features: all-wood construction; molded plastic wheels and cowl with dummy cylinder heads; full Litespan covering for a nostalgic look; scale decal sheet; instruction manual with detailed illustrations.

Comments: the Jodel kit is affordably priced, very complete and of excellent quality. Assembly takes just a few hours, and the flight performance is quite satisfying. This is a fun model to build and to fly.

HITS

- Very easy to assemble.
- Good-quality frame and covering.
- Excellent diagrams in instruction manual.
- Smooth flight characteristics.

MISSES

- Landing-gear wire is too frail.
- Prop attachment makes motor access difficult.

gauge wire. I did this using approximately 1/32-inch-diameter wire and found the task to be easy. I suspect that later kits will include heavier gear wires. The wheels supplied are made from vacuum-formed plastic and come in two halves that must be cemented together. I had my doubts on this initially, but these light plastic wheels have given me no problem at all. For realism, I painted the wheels a flat black.

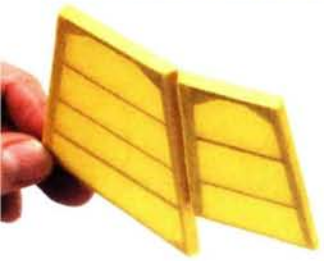
The remainder of the assembly involves attaching the stab and vertical tailpieces (both of which come with prehinged control

The vacuum-formed wheel halves have held up just fine. I did beef up the gear wire, though.

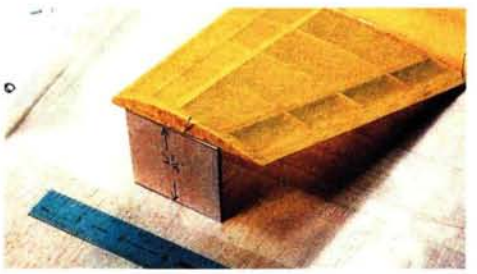
FLIGHT PERFORMANCE

Without a steerable tailwheel, the Jodel is difficult to fly from the ground, so I have resorted to hand-launching for all of my flights to date. Even at 9,000rpm, the Gunther prop makes so little noise that you may wonder if the Jodel can sustain flight. Well, rest assured: it can. Maneuvering is easy, and the model has no bad traits. Landings can be made at very slow speeds without any tendency to stall. I have concentrated on making very soft landings on every flight so as not to stress the thin landing-gear strut.

I generally fly the Jodel in 5 to 10mph winds, and it handles these without a problem. I did make a few flights in 15mph-plus winds, but I felt this was a little too much for the plane; in the higher winds, it tends to get kicked around. But the Jodel is easy to fly and should prove no problem for the average sport flier to handle.



The control surfaces come hinged and ready to glue into place.



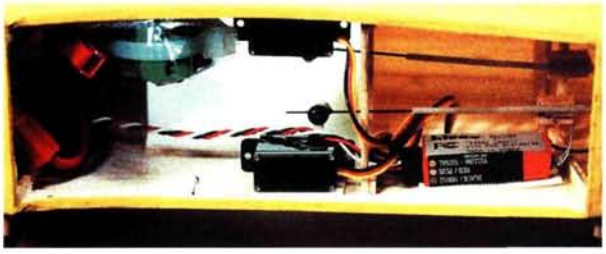
The wing comes in three sections and must be glued together at the proper polyhedral angle.

surfaces). The final steps include the installation of the control rods to operate the rudder and elevator surfaces. I found that cutting the two slots for the passage of these control rods was somewhat tricky. I kind of guessed on my particular Jodel, and I was lucky. It would be nice if the Hacker folks included a small template that showed exactly where to cut each slot. That would save a lot of time and be more precise.

For radio equipment, I initially chose my Hitec Feather micro receiver and two Hitec HS-55 microservos. Because of the anticipated crowds (and a 12-station flightline) at the first annual NEAT Fair, I decided just before the show to switch to a new FMA Direct Quantum micro dual-conversion receiver, which worked fine for me. For the speed controller, I used a Castle Creations Pixie-14 Lite ESC with a BEC. I attached both of the servos to the fuselage sides with double-sided tape. I did the same with the receiver and the ESC. I attached the 7-cell, 270mAh battery pack with hook-and-loop material and positioned it almost vertically between the wing leading edge and the main spar.

The final step was to apply the various decals and the front windshield; I used some CA Gap-type cement for the windshield. You will note that a molded front cowl is employed; it is vacuum-formed out of thin plastic. Dummy plastic cylinder heads are supplied to cement to either side of the cowl to dress it up, and I painted the cowl itself red using Testors Plastic Paint. The dummy cylinder heads are painted flat black. Make sure you provide an air opening in the front of the cowl to help cool the motor. The cooling air can easily exit the open cockpit.

The Gunther prop is installed simply by pressing it onto the Speed 280 motor shaft; there is no setscrew. In time, this prop will work itself loose, so it is advisable to put a drop or two of 5-minute epoxy on the prop/shaft joint. Unfortunately, once this has been done, it is very difficult to remove the cowl to gain access to the motor. And since the motor is held in place by a couple of rubber bands, you just know you will eventually need access.



The Hitec Feather receiver and servos are secured to the fuselage sides with double-sided tape. The 270mAh NiMH pack is hel with hook-and-loop fastener.

A direct-drive Speed 280 motor powers the Jodel, and it is mounted on ⅛-inch wood dowels with two rubber bands. This is simple and effective, but since the prop has to be glued to the motor shaft, getting to the motor after the plane has been assembled is tricky.

Hobby Lobby claims about 5 hours of assembly time for the Jodel. I don't think it took me that long, even stopping to take photos. In other words: it's easy. The instructions contain multiple language translations, which can be confusing. However, the illustrations are extremely clear and almost eliminate the need for text.

Control throws for my model ended up with the rudder moving ¾ inch on either side of the neutral position and the elevator at +/- ⅜ inch. The specified CG was 2 inches back from the wing leading edge, and with the equipment placed as shown and the battery pack installed, my Jodel balanced perfectly.

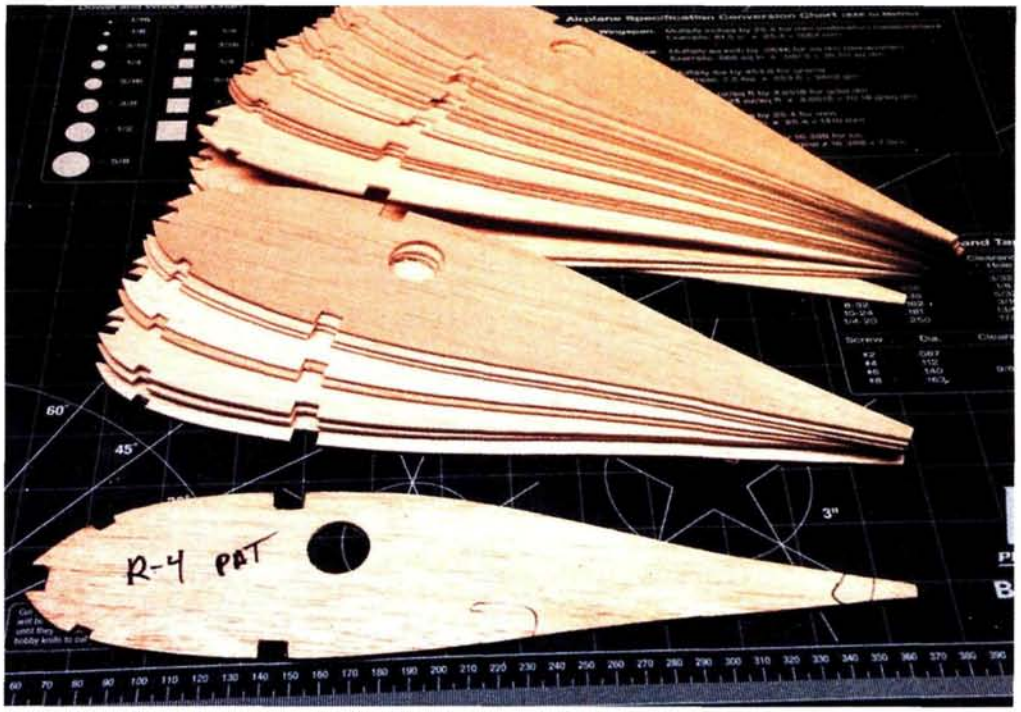
The Hobby Lobby Bebe Jodel was a fun project. The kit's quality is excellent, the price is right, and it takes only a few hours to get it flight-ready. The resulting flight performance certainly made the project worthwhile. I do believe that the landing gear will still have to be "beefed up" more than it is, but that is something I can live with. If you have been looking for a stand-off-scale electric flyer for small fields or parking lots, the Jodel is a perfect choice.

***Castle Creations**, 18773 W. 117 St., Olathe, KS 66061; (913) 438-6325; fax (913) 438-1394; www.castlerc.com.*
***FMA Direct**, 9607 Dr. Perry Rd., Unit 109, Ijamsville, MD 21754; (800) 343-2934; fax (301) 831-8987; www.fmadirect.com.*
***Graupner**; distributed by Hobby Lobby Intl.*
***Hitec RCD Inc.**, 12115 Paine St., Poway, CA 92064; (858) 748-6948; fax (858) 748-1767; www.hitecrcd.com.*
***Hobby Lobby Intl.**, 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; www.hobby-lobby.com.*
***Litespan**; distributed by **Clancy Aviation**, 219 W. 2nd Ave., Mesa, AZ 85210-1317; (602) 649-1534.*
***Testor Corp.**, 620 Buckbee St., Rockford, IL 61104; (815) 962-6654; fax (815) 962-7401.* ✦

Stack and Cut Ribs

A simple trick for constant-chord wings

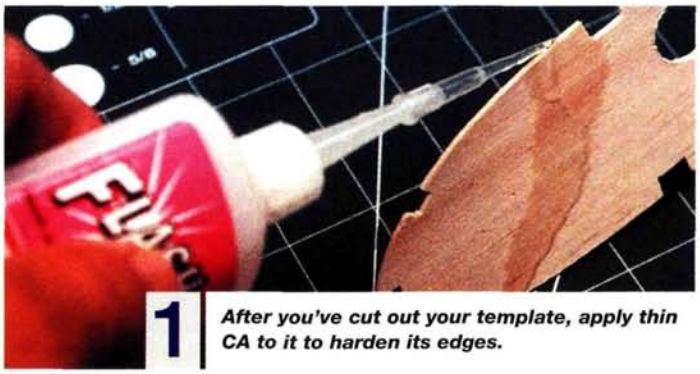
by John Tanzer



Stacking and cutting is a popular way to form constant-chord wing ribs. I use a little trick to make this method even easier.

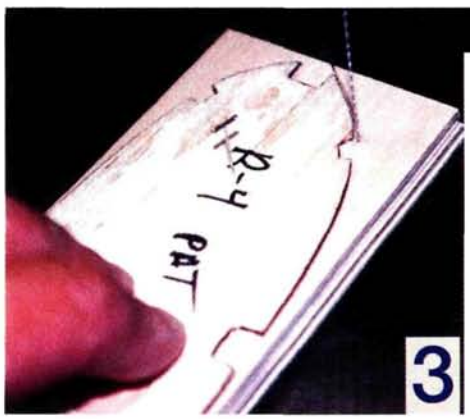
If you need to make some ribs for a constant-chord wing, here's a method that makes the process a bit easier. Cut out one rib to use as a master template; in this case, I used 1/16-inch sheet balsa. After you cut out your template, sand its edges smooth and check the notches with a short length of spar material for a good fit. To harden the template's edges, soak them with a liberal coating of thin CA, and lightly sand again. Last, blacken the edges with a black marker. The dark edges make it easy to see if you cut too closely to the template.

For the Big Boy, I needed 24 ribs, so I stacked 1/16-inch balsa-sheet blanks into two piles of 12 (one pile for each wing panel). Place the master rib on top of a stack and push T-pins through the stack to hold them tightly together. T-pins are about 1¼-inch long, so you can stack and cut about 15 1/16-inch, eight 3/32-inch, or eight 1/8-inch ribs at a time.

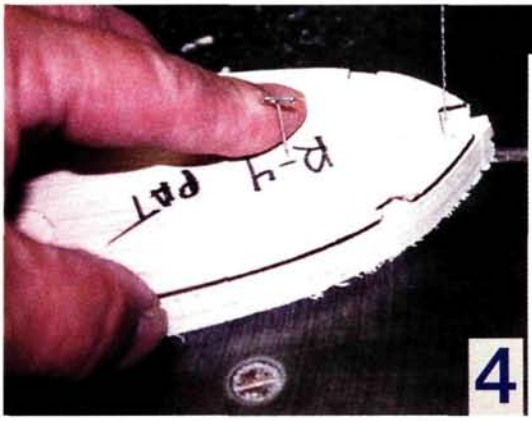


1 ***After you've cut out your template, apply thin CA to it to harden its edges.***

2 ***Blacken the edges of the template with a black marker. This will help prevent you from cutting or sanding into the template as you form your ribs.***



3 ***Pin the template on top of your stack of rib blanks with T-pins. This holds them in place until you cut and sand them to shape. Here, I use my jigsaw to cut out the ribs. I could also have used a band saw.***



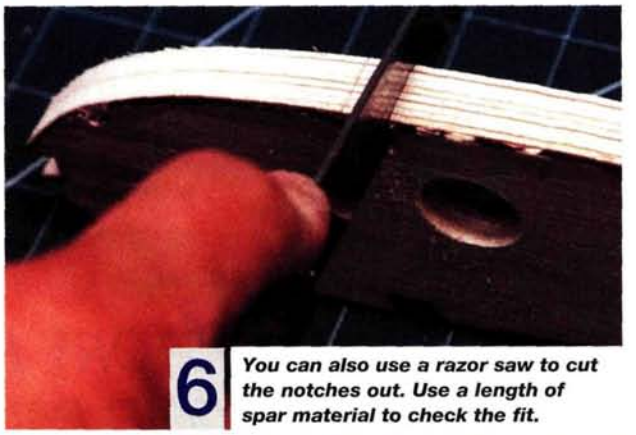
4 ***Here, I am cutting out the LE notch with the thin jigsaw blade. Note the slight space between the saw blade and the black edge of the template. The dark color makes it very easy to see what you are doing.***

Cut the stack of ribs to size; I use a jigsaw to cut out the ribs. You can use a band saw, or you can even cut them out with a razor knife. Because of the blackened edges, if you accidentally cut into the template, you can easily see the raw balsa edge. This helps greatly in cutting out the ribs.

Cut out the notches with the jigsaw or a razor saw, then sand the ribs down to the line with a sanding block, again using the blackened edges of the master rib as a guide. Sand the notches to size using a sanding stick made from a ¼-inch-square pine stick with sandpaper glued to it. I make various sizes to fit different-size notches.

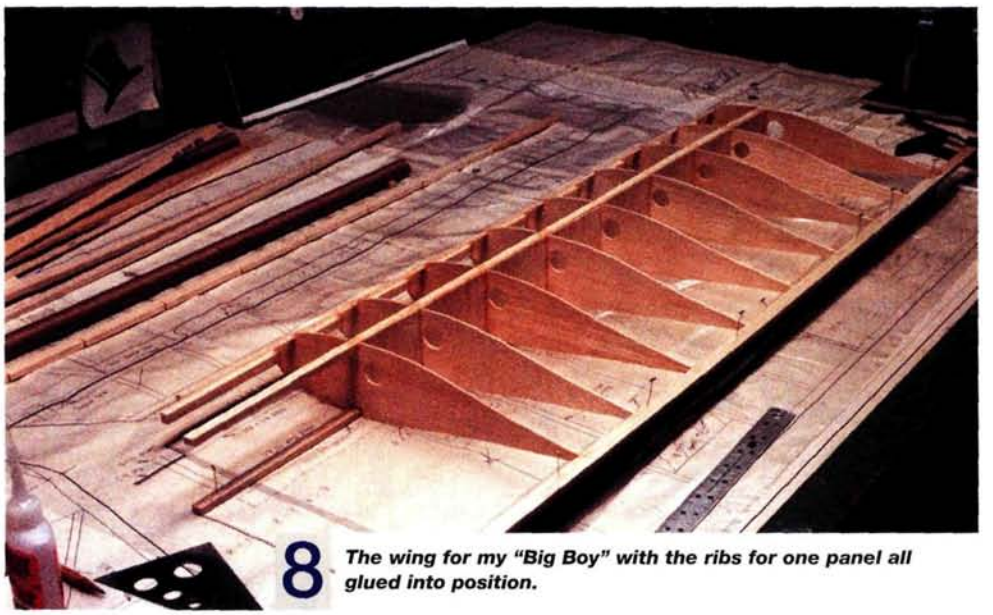
So there you have it—a simple way to make multiple ribs. The hardened and blackened template edges help prevent you from sanding or cutting into the master rib. You can use the rib template over and over and always make identically shaped ribs.

5 *Sand the stack square with a sanding block, and be careful not to sand off the template's black edges.*



6 *You can also use a razor saw to cut the notches out. Use a length of spar material to check the fit.*

7 *I use a ¼-inch-square pine sanding stick with sandpaper glued to it to square up the edges of the notches.*



8 *The wing for my "Big Boy" with the ribs for one panel all glued into position.*

PLANES WORTH MODELING

3-View Documentation for Scale Modelers

by Dick van Mourik

Zlín Z-526 F

Aerobatic flying has long been part of the Czech legacy— not surprising with the world's top aerobatic aircraft having been produced there for decades. The name "Zlín" has been synonymous with the utmost in aerobatic designs from the early '50s until far into the '80s of the last century.

In 1946, the Czechoslovakian government laid out a requirement for a basic trainer to replace the Jungmann and license-built Bestmann trainers that were in use by that time. Zlín entered with its Z-26 Tréner. This design, led by chief designer Karel Tomás, was the first in a series of what would become Europe's best-known aerobatic aircraft.

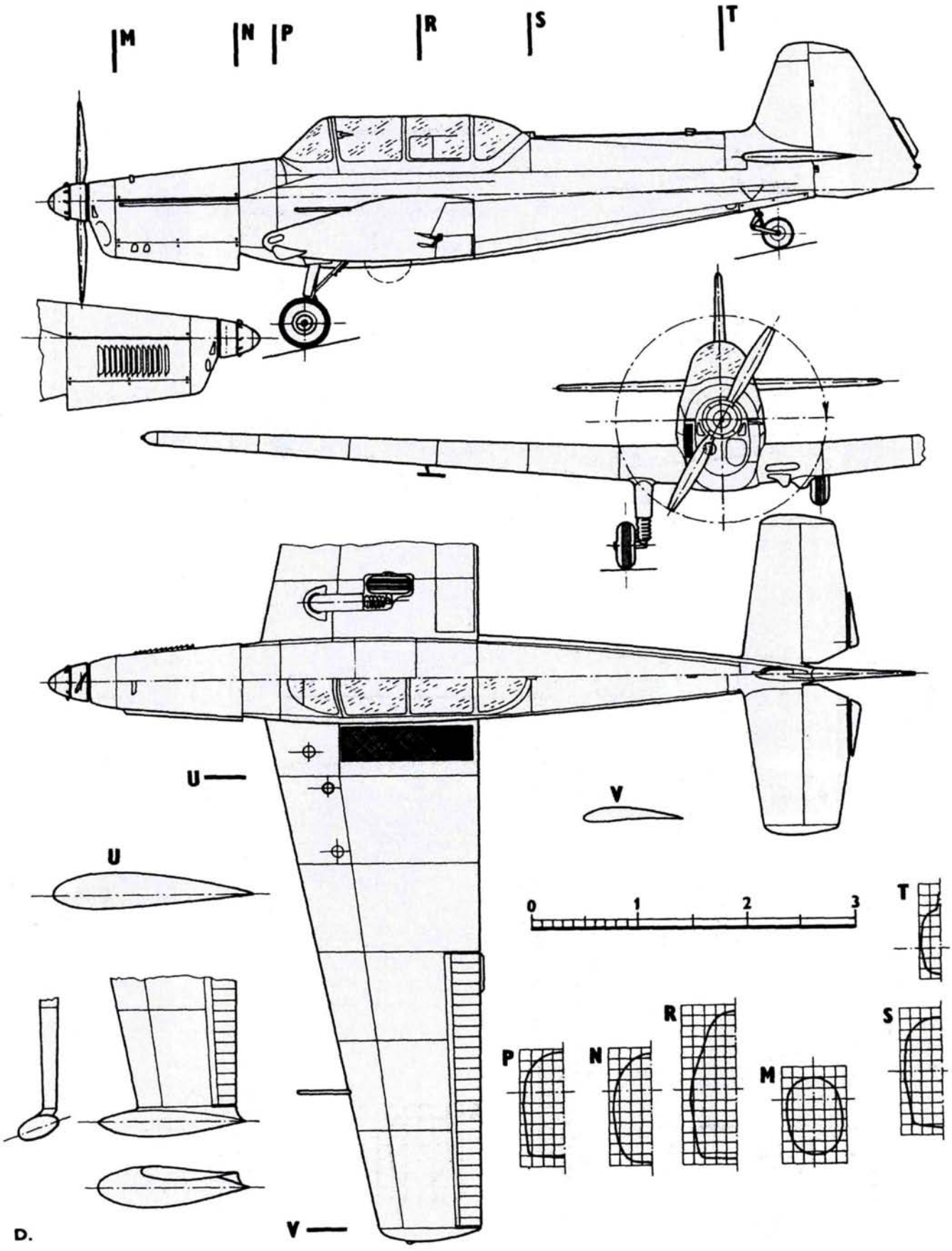
The Z-26 was of mixed construction, with wooden wings, fabric-covered rudder and elevators and a welded metal tube fuselage, which was also partially covered. The aircraft was used as a reliable military trainer and was also very popular with the civil flying and gliding clubs all over the country. A much cleaned-up version, known as the "Z-126," followed in 1953. This design featured major improvements including a different, metal wing with a thick airfoil, plenty of washout and angular, partly covered metal tail surfaces instead of the Z-26's curved wooden ones. This was the first of the characteristic long-nose Zlíns. Subsequent Z-226, 326 and 526 designs and, finally, the Z-726 model, totaled several thousand examples.

The Z-526, an all-metal aircraft, was produced in the largest numbers. A total of 325 aircraft have been constructed in seven versions, while another seven examples were retrofitted in some way.

The Z-526 F featured here is used for flight training, glider towing and most of all, aerobatics. It is powered by the fuel-injected, 180bhp M-137 engine, which drives a fully automatic V-503 A airscrew. This aircraft resides near Prague at the Aero Klub in Karlovy Vary. ✈

SPECIFICATIONS

Name: Zlín Z-526 F
Wingspan: 35 ft.
Length: 26 ft.
Height: 6 ft. 9 in.
Wing area: 166 sq. ft.
Wing loading: 12.5 lb./sq. ft.
Engine: M 137 inverted 6-cylinder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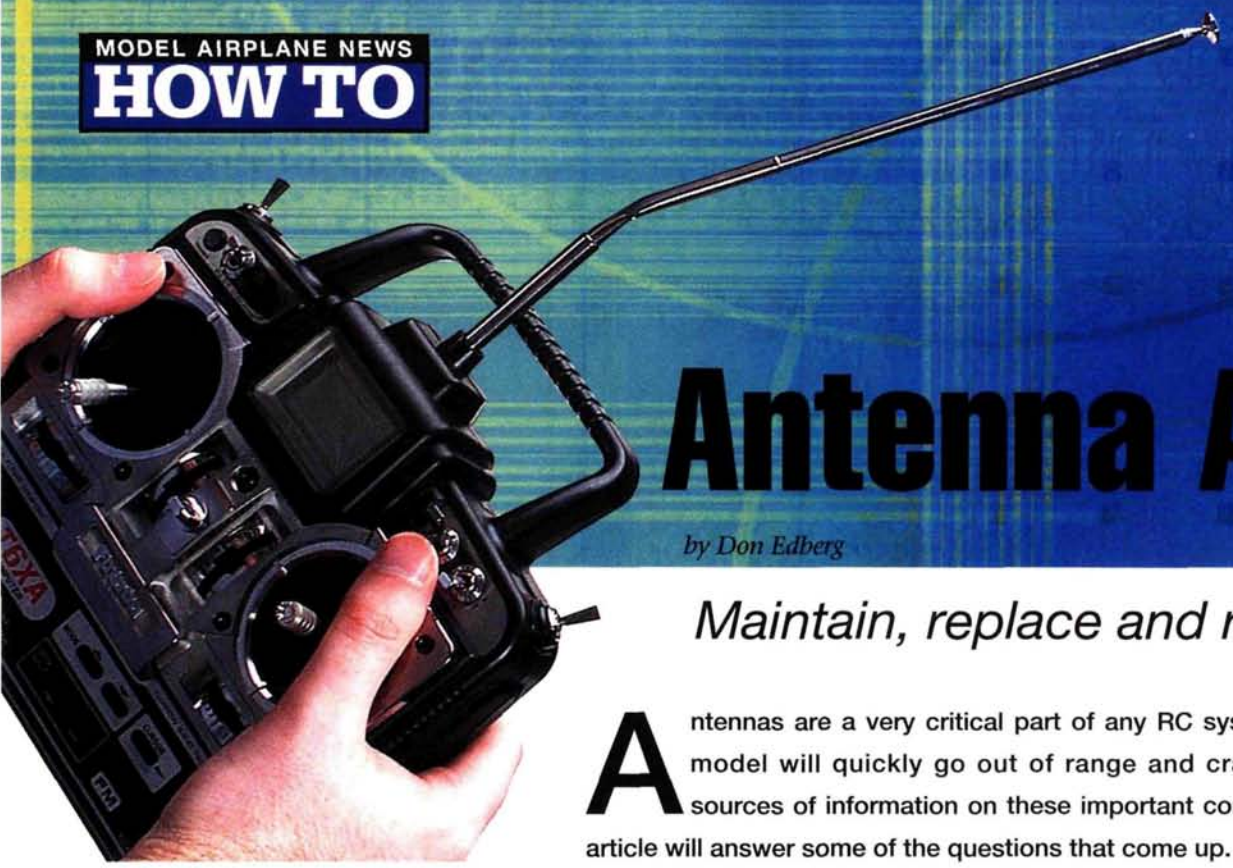


Antenna ABCs

by Don Edberg

Maintain, replace and repair them

Antennas are a very critical part of any RC system: without them, your model will quickly go out of range and crash. There aren't many sources of information on these important components, so I hope this article will answer some of the questions that come up.

JR sells an optional shorter antenna that does not reduce range and is handy for some applications.

WHAT A TRANSMITTER ANTENNA DOES

On a transmitter, the antenna is known as a "radiator" because it radiates radio waves (sometimes called "radio-frequency," or RF, energy) in all directions. It forms part of a tuned circuit that is made to efficiently produce radio waves on the frequency that you want. The transmitter is tuned with a mechanical component called a "crystal," along with electronic components (resistors, capacitors and others). The frequency is not affected by the length of the transmit antenna, but the range is. Range is defined as the maximum distance a system can be operated without loss of control and, for RC systems, it varies from hundreds of feet to miles, depending on the particular system and environmental conditions, such as nearby metal, etc.

Almost all model airplane RC systems are shipped with what's called a "whip" antenna that tapers from a thicker portion at the base to a narrow portion at the tip. Reducing the transmitter antenna length simply reduces the range, just as an 8-foot-long fluorescent light appears much brighter from a distance than a 2-foot bulb.

You should keep the transmitter antenna fully extended except when you are range-testing. The broadcasting electronics in the transmitter will also become hot when the antenna is collapsed. This is because the electronics have to absorb the radio energy that doesn't go out of the antenna. The back of the transmitter will become hotter to the touch than when the antenna is extended. This is sort of like running a car engine at high throttle with the transmission in neutral—the engine over-revs and gets hot. It's better to keep a load on it by extending it fully. The heat caused by transmitting with the antenna collapsed can lead to premature failure of the radio-frequency electronics and should be avoided as much as possible. You can do a range-check with the antenna collapsed, but don't operate it this way for extended periods.

TRANSMITTER ANTENNA MAINTENANCE

Inside each segment of a whip antenna, a pair of sliding brass contacts maintains electrical continuity. These contacts must be kept clean to ensure that the RF energy passes through properly. After some use, antennas can become dirty and gummy from exhaust and dust, and it's harder to extend and retract the segments. I recommend that you clean and lubricate the antenna every few months, or whenever it becomes difficult to extend or collapse.

To clean your antenna, spray a lubricating/cleaning liquid such as TAL-5 from WD-40 onto a spot on an old rag, then use the rag to "scrub" the exposed surface of the extended antenna. Then collapse and extend the antenna and run the rag over it again. After repeating this a few times, the antenna will become noticeably easier to extend and retract, and the rag will look green; this is rusted and oxidized antenna-contact metal! Repeat this until the cloth or towel remains fairly clean.

Reduced-length transmitter antennas are available for models not conducive to long trailing antennas, such as helicopters. This one is available from Hobby Lobby.

If you can unscrew your antenna and remove it from the transmitter, spray a little of this cleaner/lubricant into the hole in the bottom of the antenna and clean it as well. (Don't spray it into your transmitter!)

REPLACING A TRANSMITTER ANTENNA

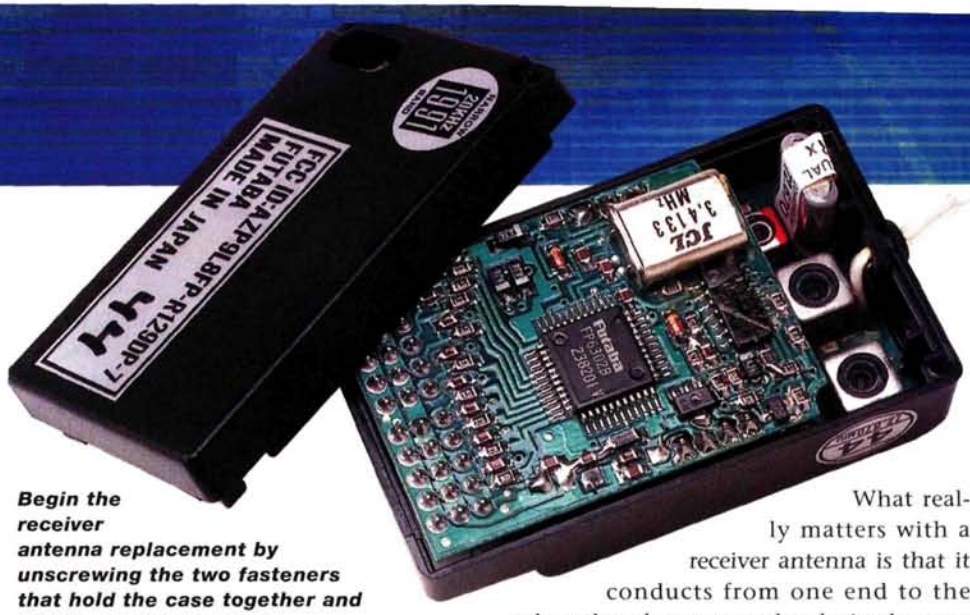
If you've cleaned your antenna and it still doesn't work right, or if it's jammed, bent or broken, you should replace it with a new one. In an emergency, I successfully soldered damaged segments back together with brass tube acting as a "splint"; although the antenna did not collapse properly, at least it radiated so that I could fly until I got a replacement.

To remove the whip antennas in most transmitters, you only need to unscrew them. This type of antenna has a threaded hole at its bottom that turns onto a threaded bolt that's near the top of the transmitter. Replacing a damaged antenna with a good one takes only a few seconds.

On some radios—usually those with antennas that can swivel to different angles—the base of the whip is secured inside the transmitter. This type is a little trickier to replace, but it can be done. Locate where the bottom of the antenna comes to rest inside the transmitter (you'll usually have to remove the battery pack to do this). You should see a small hole. With the right size hexagonal wrench, you can loosen the head of the securing bolt. If you carefully unscrew the antenna stem, you can remove it from the transmitter case and replace it with a new one, then tighten the bolt so that the new antenna is secure. If you'd rather not attempt this repair, send the transmitter to a repair shop.

A long, extendible transmitter antenna can be inconvenient in close or crowded situations. JR sells a replacement "base-loaded" antenna that's approved for use with its systems. This type of antenna has a loading coil near its base that allows the antenna to perform as though it were longer than it really is.

A "rubber duck" antenna is another option; be sure to buy one that's made for your radio system.



Begin the receiver antenna replacement by unscrewing the two fasteners that hold the case together and gently opening the case.

Other manufacturers offer replacement "rubber duck" antennas that consist of a short coil of springy wire, usually wrapped with insulating plastic. Although FCC certification does not allow RC system owners to make any modifications to their transmitters other than replacing parts, many people use the rubber duck antennas without any ill effects. I do not recommend the use of these antennas without the approval of the system manufacturer, however. In addition, if you are involved in an accident while using modified RC gear, you may not be covered by your insurance.

WHAT A RECEIVER ANTENNA DOES

The receiver antenna is a conducting wire that picks up the RF transmission from the transmitter. It operates sort of like the funnel-shaped collector on an old-fashioned hearing aid: it just "scoops up" the RF energy and funnels it to the receiver.

Although many believe that the length of the receiver antenna is critical to proper operation, this simply isn't true. You can see this by examining various receivers on different bands. In the old days, when most systems were made in the U.S., the receiver antennas were 36 inches long. As manufacturing has moved overseas, the standard length of a receiver antenna has evolved to 1 meter (39.4 inches) long. This is true for 72, 50 and 35MHz frequencies! If length is so important, then the antennas should be different lengths for different frequency bands.

What really matters with a receiver antenna is that it conducts from one end to the other; that there are no breaks in the conductor; and that it is not folded or coiled to save space. If you fold the antenna or coil it, it has less length to "sweep up" the radio waves, so range is reduced. This is why manufacturers tell you to let the excess antenna trail behind the model rather than fold or cut off the excess.

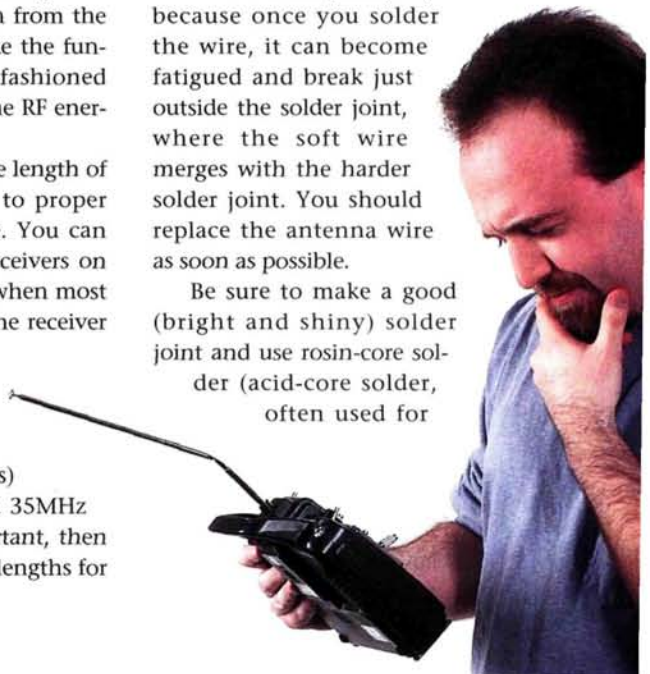
You should periodically inspect the receiver antenna to ensure its integrity. Nicks or breaks in the antenna's insulation could be signs of damage, and you should replace the antenna soon. If the wire inside is broken, do not fly, as your range could be severely reduced.

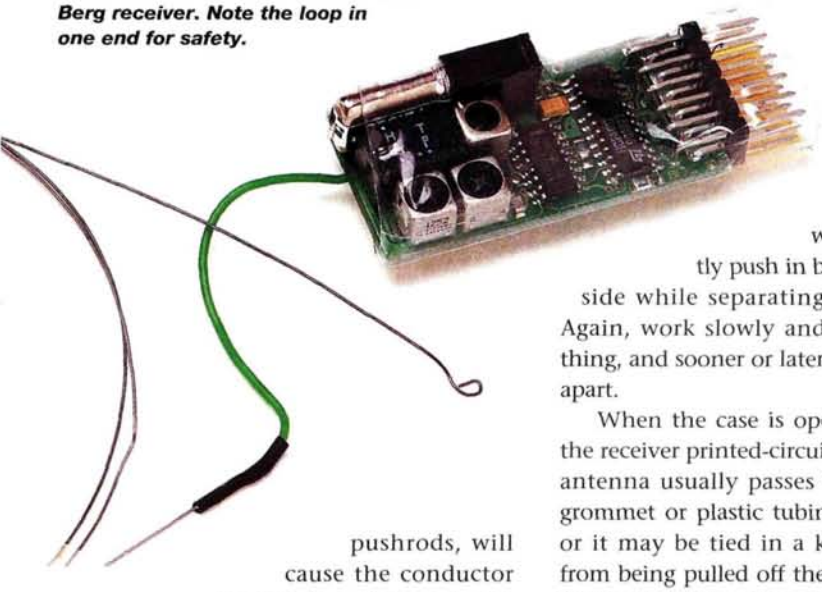
REPAIRING RECEIVER ANTENNAS

When the receiver antenna wire is damaged badly enough to be repaired, don't despair. If you break or cut the antenna wire, you can make a temporary repair by soldering the two severed ends back together and covering the joint with heat-shrink tubing for insulation. The repair is not hard to do; as I mentioned before, the important thing is that the conductor is not broken.

This is a temporary repair because once you solder the wire, it can become fatigued and break just outside the solder joint, where the soft wire merges with the harder solder joint. You should replace the antenna wire as soon as possible.

Be sure to make a good (bright and shiny) solder joint and use rosin-core solder (acid-core solder, often used for





A music-wire antenna soldered onto a Berg receiver. Note the loop in one end for safety.

pushrods, will cause the conductor to corrode, and the antenna will fail). If you aren't sure how to do this, find a friend who has some soldering experience. As I said before, the small amount of antenna length you lose when you join the severed ends will not make a difference. The joint *must* be soldered; if you just twist the conductors together without soldering, they may unwind and disconnect or rub together and make intermittent contact, resulting in serious glitching.

REPLACING RECEIVER ANTENNAS

If you damage the receiver antenna more seriously, you will have to replace the entire length. If you don't have soldering experience or you're not comfortable doing this, please send your receiver to an RC repair shop and have the antenna professionally replaced.

You'll need 1 meter of replacement antenna wire, tools to open up the receiver case, a fine-tip soldering iron and rosin-core solder. All of these tools and materials are available at shops like RadioShack.

The receiver antenna wire is usually 26-gauge, multi-stranded wire. It must be stranded, or else it will break after it bends back and forth a few times. It should have at least 18 strands (more strands increase flexibility). Hobby shops often supply bundles of wire, but you may have to buy a whole spool of wire.

Most receivers have two fasteners that hold the case together at one end and two plastic keys that hold the other end together. To open the case, unscrew the two fasteners and gently pivot the case away from the fastener holes (as though there were a hinge at the other end). Working slowly and gently, now separate the case halves (one case half holds the receiver electronics).

Some receiver cases have plastic latches at each end. The trick with these is to gently push in both latches on one side while separating the case halves. Again, work slowly and don't force anything, and sooner or later you'll get the case apart.

When the case is open, gently remove the receiver printed-circuit board (PCB). The antenna usually passes through a rubber grommet or plastic tubing for strain relief, or it may be tied in a knot to prevent it from being pulled off the PCB. Remove the PCB and wire from the case.

Here's the trickiest part of the procedure: you need to unsolder the broken antenna wire and solder in the replacement. First, sketch the location on the PCB where the antenna is soldered; it can be difficult to find after you've removed the antenna! Strip about 1/32 inch, or 1mm, of insulation off the replacement antenna wire, and tin it with the iron and some solder. Cut off any excess soldered length so very little protrudes from the insulation. If there was a knot in the old antenna wire, tie a similar knot in the new one. Now, solder the new wire in the same place the old wire was.

Now carefully inspect to see that you have not created any solder "bridges" between the antenna pad and any other pads on the PCB. You can reassemble the receiver by threading the new antenna into its strain relief, putting the PCB back into the case and reassembling the PCB and case. Do a range-check to make sure that everything's OK.

SHORTENING RECEIVER ANTENNAS

The 1-meter-long receiver antenna wires can be inconvenient for small models, pylon racers, helicopters and other model types. There are two options: make the antenna shorter, or replace it with more durable wire.

There are several sources of base-loaded receiver antennas that can reduce antenna length to about 10 inches. W.S. Deans base-loaded receiver antennas are commonly used on helicopters, where long receiver antennas can get in the way of everything! To use one, you cut off your receiver antenna and solder it onto a connector pin that's connected to the new antenna.

You can also replace the receiver antenna with something stiffer and tougher. I learned this idea from Brian Buass, the designer of many high-performance electric pylon racers and hand-launch gliders. Brian uses very thin music wire to replace the conventional antenna. The stiffness of the music wire does two things: it reduces drag because it points almost straight backward from the model; and it prevents the antenna from looping around and getting in the way of the propeller!

Use the thinnest music wire available at the hobby shop; I used 0.016-inch diameter. Cut the music wire to the same length as the piece of stock antenna you will remove, and then cut the receiver antenna off about 3 to 4 inches away from the receiver. Solder what's left of the stock antenna onto the 0.016-inch music wire and add a piece of heat-shrink tubing to relieve any strain on the solder joint.

A few words of caution: the music wire isn't insulated, so be sure that the antenna wire *does not contact* any metal parts in the model. If it does, electrical noise will definitely interfere with your RC system. Also, use needle-nose pliers to bend the end of the music wire (which can be very sharp and nearly invisible) into a loop, so it's less dangerous.

GROUND RANGE-CHECK

Place your model on the ground with its antenna pointing away from you and as far away as possible from metal objects (fences or buildings), other transmitters and other people. Grass or dirt is best because concrete often has steel reinforcing bars embedded within it, and these can mess up range. Don't let someone hold the model—the person who holds it increases the signal

A base-loaded receiver antenna. It's a lot easier to deal with a 6-inch antenna than a 39-inch one! This one is available from W.S. Deans Co.

the model receives. Bystanders should be 10 or more feet away. Collapse the transmitter antenna as far as it can safely be operated, turn on the transmitter and receiver, and choose a control movement that is visible from far away. A friend can listen for servo jitters and motion and give hand signals if you get very far away, but make sure he stays a few feet away from the model, too.

Now, as you move the control back and forth, slowly walk back from the model. Continue until the control no longer moves as the stick does, or becomes nervous or glitchy. Count paces as you walk back to the model, and write down the number. If this number changes drastically in subsequent checks, you might have a problem. Do a range-check regularly; ideally, before each flying session.

Ground tests are even easier with PCM radios that have a fail-safe feature. Just set the model up so that some visible control goes hard over for fail-safe. Then you can just walk until that control moves. You may find that you have to go quite a way back to regain control; this is normal with PPM/FM and PCM radios. (Don't forget to reset the fail-safe position after the ground test.)

The distance to the model when control is lost can vary tremendously among different makes and models of radios. I have measured well over 300 paces of ground range on an older Futaba FM "J series" with a collapsed antenna! Other radios may go around 30 paces, depending on how much of the antenna is exposed outside of the transmitter, whether the case is metal or plastic, etc. The approximate range may be specified in the instruction manual for a given system, but it is better to do your own test so that you know how your system behaves.

Be sure that you repeat the test under the same circumstances that you used previously and away from other transmitters and people. Often, moving the transmitter up or down, turning your body, or holding the transmitter firmly on your stomach will make a difference, as will wet versus dry ground.

I hope you found this article on antennas to be helpful. Let me know what other topics you'd like covered. You can email me at man@airage.com, or write to me c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA (please include an SASE for a reply). I get a lot of mail, so please be patient!

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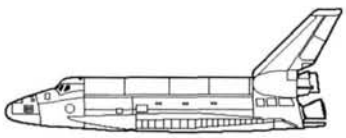
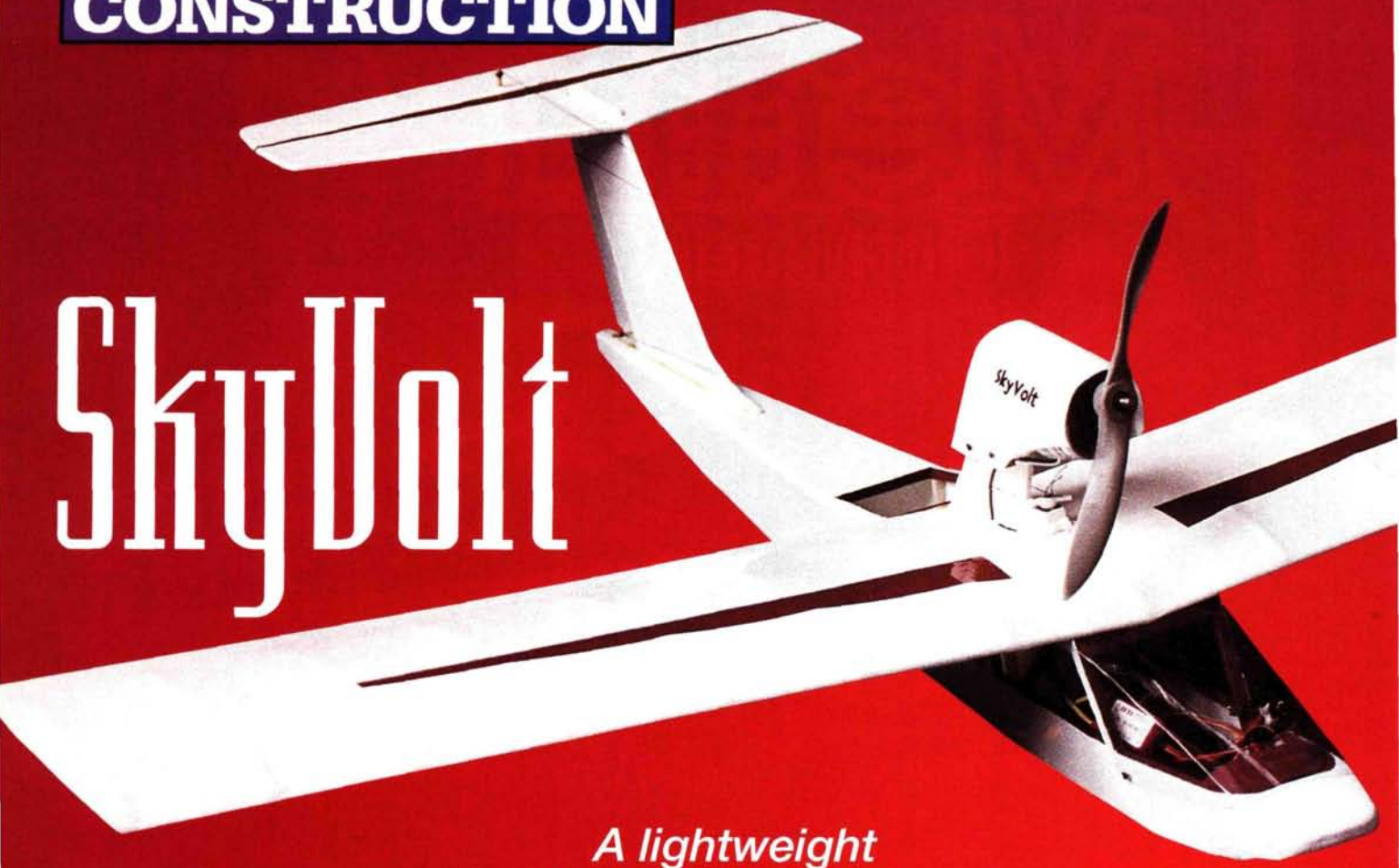


SkyVolt



A lightweight Speed 400 park flyer

by Clark Salisbury

My first electric park flyer was the Hobby Lobby Demoiselle. This airplane comes with a geared, Speed 280 motor, and it is a lot of fun to fly. I converted it to Speed 400 power, and the increase in its performance was beyond my expectations. It could fly easily for about 7 minutes on a charge, and I flew it at many locations, all within 3 miles of where I live. It was this easy-to-fly-anywhere convenience that led me to design my own park flyer.

Basically, the SkyVolt came about because I wanted a little more speed and excitement with a model I could still hand-launch. The SkyVolt does require a slightly larger field because of its increased speed, but I have five places close to my home that work great. Schoolyards, ballparks and any other open field I can find are perfect for the SkyVolt. I no longer need an RC flying field or runway.

CONSTRUCTION

• **Wing.** The left and right wing panels can be built at the same time by laying a piece of wax paper over the plan and then pinning and gluing the pieces into place. I prefer to use Elmer's carpenter glue (aliphatic resin) mainly because it doesn't irritate my eyes. Start by positioning the bottom ⅛-inch-square balsa spars, and the balsa trailing-edge (TE) stock. Next, glue all of the wing ribs and the upper spar into place except the center ribs (where the wings join). Note that there are small building tabs attached to the outer wing ribs, and that the TE rises up at the tips of the wing. This puts in a slight amount of washout, which helps prevent tip-stalling.

SPECIFICATIONS

Wingspan: 43 in.

Overall length: 32.5 in.

Weight: 18 oz.

Radio req'd: 3-channel (elevator, rudder, speed control)

Radio used: Hitec AM

Motor: Graupner Speed 400 with 2.5:1 reduction gear drive

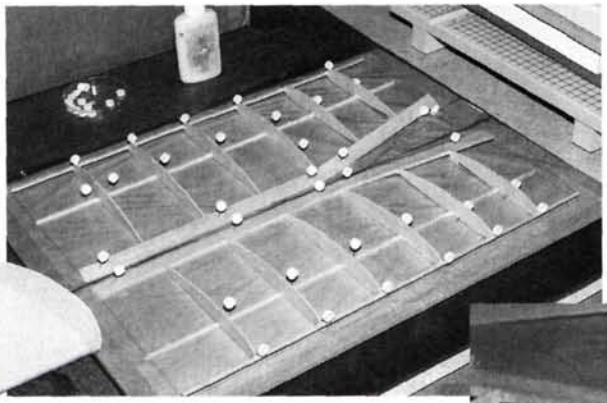
Propeller: APC 8x7

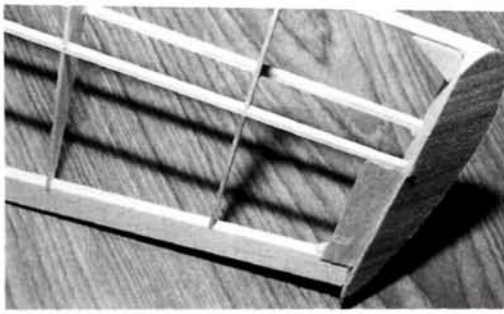
Drive battery: 7-cell (350mAh)

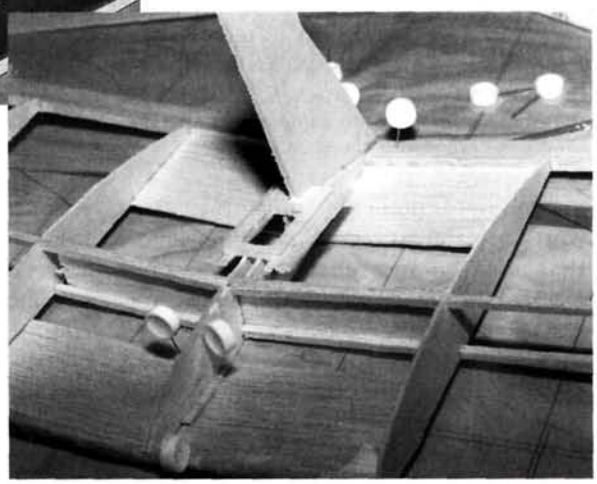
Flight time: 3.5 mins. at full throttle

Comments: the SkyVolt is a fun little park flyer that is meant to be hand-launched. The model is very light and uses stick construction. The wing is glued to the fuselage, and the motor is attached to a vertical pylon. The rudder and elevator use pull/pull threads for control. Although it does have a couple of wheels mounted to the bottom of the fuselage, landing in grass is best.

The author's son, Mark, shows off the SkyVolt







Add the 3/16-inch leading-edge (LE) dowel to both panels, and glue it into place. Once the glue has dried, cut the wingtip blocks to shape and glue them into place.

The wingtips should lay flat on the workbench even though the outer ribs do not.

Now add the 1/16-inch balsa sheeting and wingtip gussets to the wing, as shown on the plan. Before you glue the two panels together, add the R1A rib doublers to the root ribs. When the panels are glued together, a slot is formed behind these doublers so the motor pylon can slip into place. Raise up one of the panels, glue the dihedral joiner into place and clamp it with clothespins so the wing has about 5 degrees of dihedral. Glue the motor-support pylon into place making sure it is straight up and down, then add the rudder servo-mount plate to the center ribs. Cut away the rib material below the tray so the servo will fit into place. Add some scrap balsa pieces to the undersides of the servo mount so there is some material for the MonoKote to adhere to.

• **Tail surfaces**. The horizontal stabilizer, elevator and rudder are made of 3/16-inch-square balsa and a few pieces of 3/16-inch-thick balsa sheet. The vertical fin is made of 3/16-x-3/8 and 3/16-inch-square balsa for added strength. Once the tail feathers are built, install the hinges. I recommend that you use nylon hinges (three for the rudder and four for the elevator). Don't use any other type of hinge, as nylon hinges work best with the pull/pull control system. The control horns are simply lengths of 1/8-inch-diameter dowels glued into place through holes in the rudder and elevator as indicated on the plan.

• **Fuselage**. The fuselage sides are first built flat over the side view on the plan then placed vertically over the top view and joined together with crosspieces. Do not install the 3/16-inch balsa sheet pieces at the rear window or the 1/4-inch oak piece at the windshield yet. These are added later, after the sides have been bent into shape as you glue the tail ends together. The crosspieces are 1/8x1/4-inch balsa at the top and bottom of the cabin area. Let these pieces dry before you put in the other 1/8x1/4-inch pieces at the front and rear of the fuselage. Also add the 3/16-inch balsa piece on which the tail will be mounted. I use elastic bands to help hold the fuselage together as the glue dries.

Once the glue has dried, install the 1/8-inch plywood landing-gear plate. Glue the nose block into place, and sand it to shape. Now add the 3/16-inch balsa pieces at the upper rear of the window openings and the 1/4-inch-thick oak hard points for the windshield installation screws. Sand all the edges and the corners of the fuselage, and then dry-assemble everything to make sure the tail surfaces and the wing fit properly.

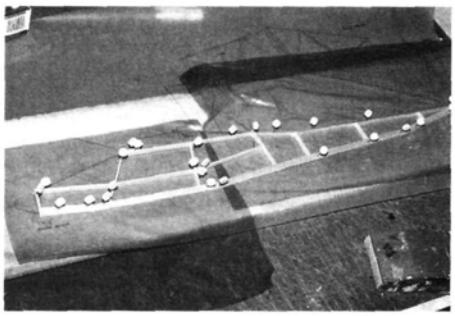
• **Covering**. At this point, cover the airplane with whichever material you prefer. I used MonoKote. As you cover the model, be sure not to warp or twist the wing out of shape. The wingtips' bottom edges should lie flat on the table after covering.

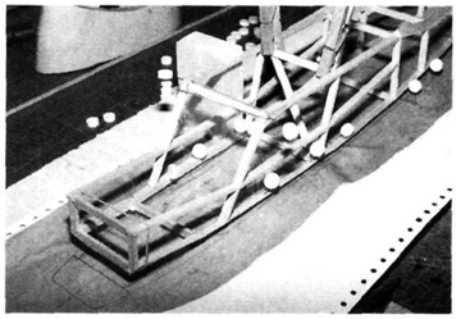
Top left: start by building the wing panels on a flat surface. Note that the outer TE tapers forward. Top right: the wingtips are made from balsa blocks. Note that the bottom edge is not flush with the TE. This is because washout is built into the wing panel as it is built. The small section of balsa sheeting at the tip is there so the covering film has something to adhere to. Bottom: here, the two wing panels have been joined, and the bottom wing sheeting has been attached. Note that the servo tray and the motor attachment pylon have been added.

FLIGHT PERFORMANCE

Make sure your servo direction is correct and that the speed control is working properly for the electric motor. My first flights were always done with someone else hand-launching the plane; I was afraid of not being able to control it during the first few critical seconds. After seeing that the plane would indeed climb out straight and level, with no radio inputs, I decided to try hand-launching it myself. It turned out to be no problem. You should have about 10mph of airspeed when you launch the plane directly into the wind. Don't fly the model with a wind of more than 5 or 6mph, however, unless you like flying a model that behaves more like a kite. The SkyVolt flies at about 20mph in calm conditions, so it is a lot of fun.

I found that deadstick landings are no problem, and landing on grass is easiest on the fuselage bottom. The main thing you should do with this plane is have fun. It is not an aerobatic plane, but it will zip along fast enough to keep you on your toes, and it will catch everybody's attention at the local park or schoolyard.





Left: start fuselage construction by building the sides flat over the side view. Right: this photo shows the fuselage sides being joined with the crosspieces. The clothespins clamp the diagonal cross-braces into place.

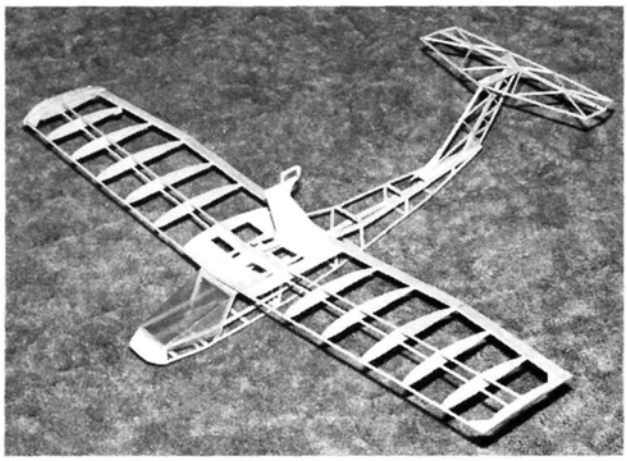
If some warps do occur, simply twist the wing into the correct shape, hold it in that position and reheat the covering material. Removing all the sags and wrinkles should correct the twist and hold the wing in the correct position. Leave the wood bare where you will glue the tail surfaces. Also note that the wing is glued to the top of the fuselage cabin and should have bare wood where the wing touches the fuselage.

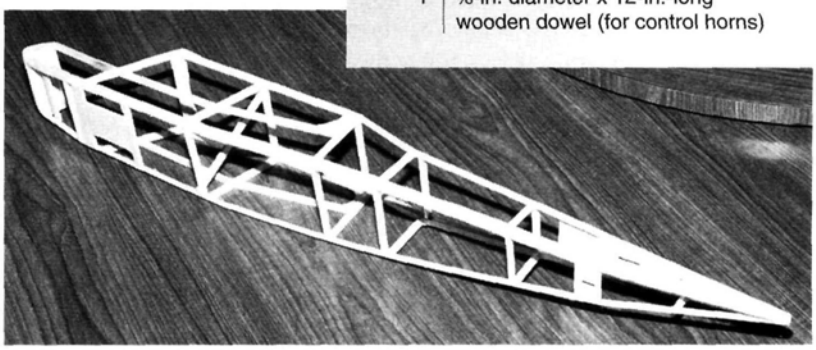
To help hold the stabilizer in place, glue a 3/16-inch-thick balsa strip to the top of the horizontal stabilizer (see plan). Then sand and paint it to match the covering.

• **Control system.** To save the weight of heavy pushrods, I externally mounted the servos and used pull/pull actuator threads to control the rudder and elevator. The ends of the threads must be twisted and coated with a small drop of CA glue to prevent them from unraveling. When you tie the threads between the servos and the dowel control horns, make sure that the servo arm and the control surface are at their neutral positions. Another small drop of CA will prevent the knots from becoming undone.

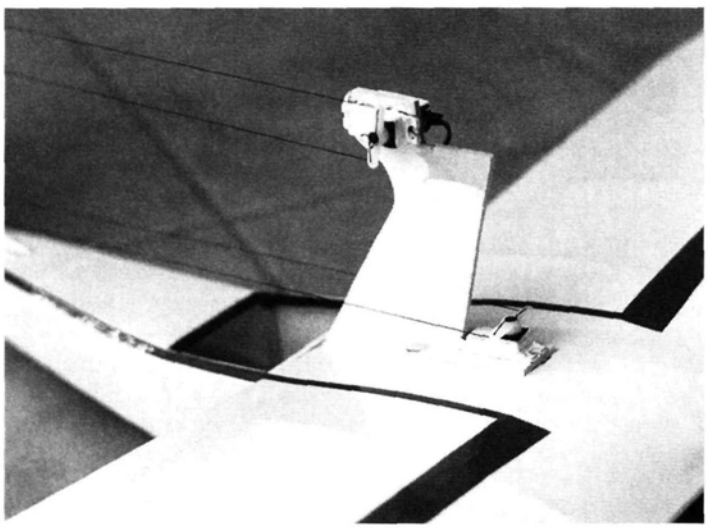
MATERIALS NEEDED

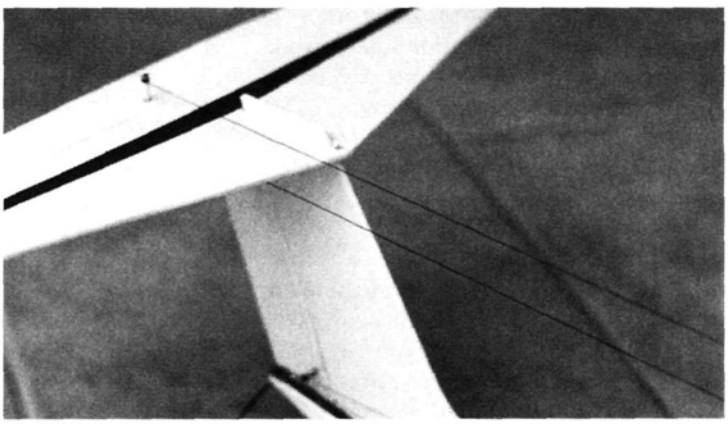
Qty.	Description
2	1/16x2x36-in. balsa sheets
2	1/8x1/4x36-in. balsa strips
3	1/4-in.-square x 36-in.-long balsa strips
6	3/16x3/16x36-in. balsa strips
2	3/8x3/16x36-in. balsa strips
1	1 1/2x1 1/2x12-in. balsa block
1	3/16x3/4x36-in. balsa sheet
1	1/8x12x12-in. Lite plywood sheet
2	3/16x3/4x36-in. tapered balsa trailing edge (TE) stock
2	3/16-in. round hardwood dowels, 36 in. long
1	roll MonoKote
1	0.020 clear acrylic 12x12-in. (for windshield)
1	small scrap piece of pine, 1/4-in. thick
1	1 1/2-in. racing wheel
1	1/16x3-in. music wire (axle)
1	strong thread, 48 in. (for servo to control surfaces)
1	1/8-in. diameter x 12-in.-long wooden dowel (for control horns)



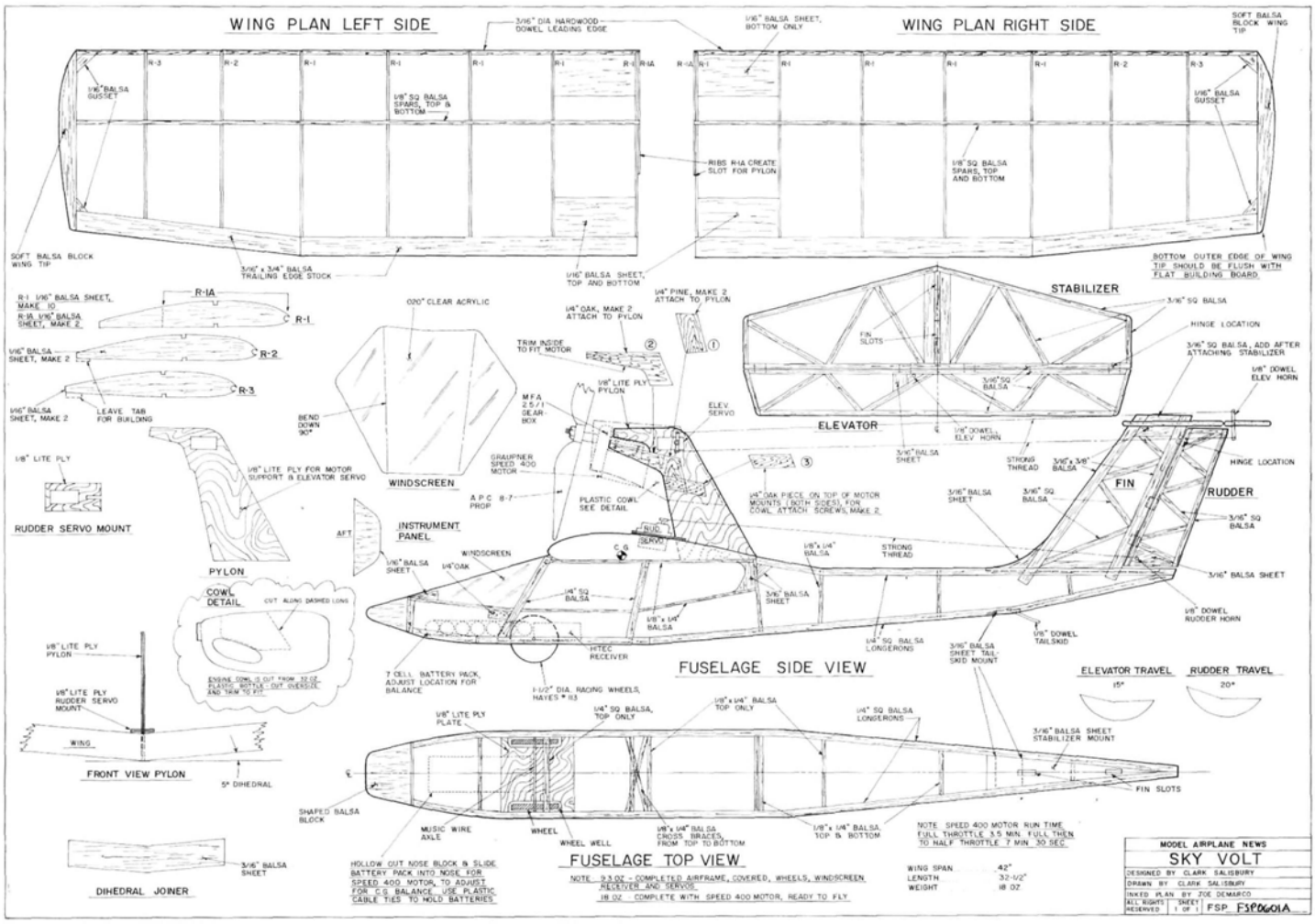


Left: the completed SkyVolt park flyer, ready to cover. Above: the completed fuselage structure. Note that the wheel attachment plate has been added to the bottom of the cabin section. You can build the model without wheels.





Left: here, the elevator (top) and the rudder servos are installed in the covered model. The pull/pull control thread has also been attached to the servo arms and the control horns. Above: lengths of 1/8-inch dowel are used as control horns. The thread is simply tied to the dowels and secured with a knot and a drop of CA.



To order the full-size plan, turn to "RCstore.com" on page 152.

• **Final assembly**. The geared Speed 400 motor is attached to oak mounts that must be glued to either side of the motor pylon. Glue the oak pieces in the order shown on the plan, so a total of six pieces are glued to the pylon. Before you glue and clamp these pieces into place, attach the motor to the mounts to make sure that the propeller—I used an APC 8x7—clears the front of the wing. The motor should have 15 degrees of positive upthrust. When the glue dries, the entire assembly can be painted, if you desire.

The motor cover is cut out from a plastic bottle (drain cleaner, bleach, etc.) and is simply cut out as shown on the plan, using a razor or scissors. Attach the cover to the motor pylon with four small screws.

I used a Hitec AM radio and two HS-60 microservos. To control the motor, I used a Jeti JES14 ESC from Hobby Lobby. I used the battery eliminator circuit (BEC) in the ESC to save the weight of the receiver battery pack.

Install the motor-drive battery pack in the nose as far forward as necessary to correctly position the center of gravity. I used silicone adhesive to hold the battery pack and receiver in place, and I hollowed out the nosepiece to get the battery as far forward as I could. The windshield is held in place with two small screws threaded into the oak pieces on the fuselage sides.

That's about it. There's nothing left to do except charge up your batteries and head to a park or schoolyard. The SkyVolt will convert all sorts of local spaces to potential flying fields, so keep it in your car for those spur-of-the-moment flights. I hope you enjoy your model as much as I have mine. Good luck!

APC Props; *distributed by Landing Products, 1222 Harter Ave., Woodland, CA 95776; (530) 661-0399; fax (530) 666-6661.*
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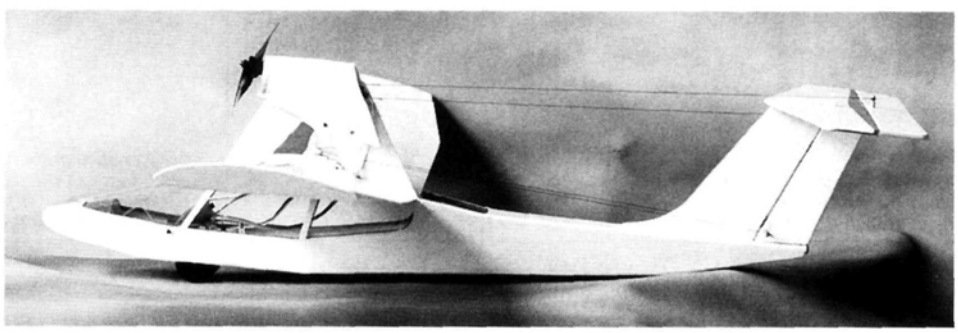
Jeti; *distributed by Hobby Lobby.*



Personalize your pilot

Easy tips to make one-of-a-kind figures by Faye Stilley

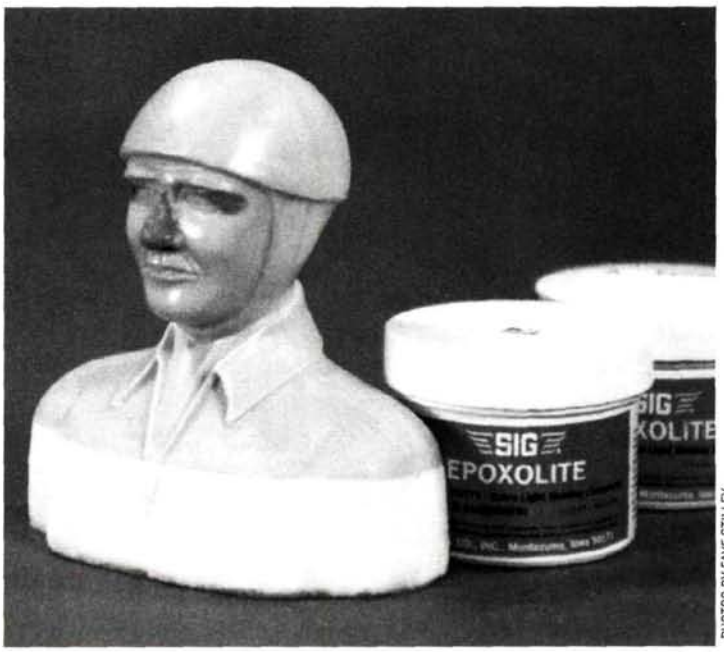
Meet Wilhelm. He looks right at home in my Fokker, doesn't he? He didn't look like this at the hobby shop; he looked like a plastic dummy. He definitely needed some "fixing up" to be suitable for a WW I aircraft. An airplane making a low pass looks totally unrealistic if there isn't a pilot figure in the cockpit; the whole illusion is spoiled. Sure, adding a pilot figure is one more thing to do, and because so many figures aren't realistic, you may not think it's worth the effort. But there is a way to fix that problem, and when it's done well, it is both worthwhile and rewarding.

BUILDING YOUR PILOT

1 This is a Williams Brothers pilot figure—they've been around for decades. They are inexpensive, lightweight and simple to finish: just glue the halves together and paint. Original they are not, and they lack the realism that many scale builders desire; however, they are much better looking than some of the things I've seen in airplanes. Some guys cut the heads off rubber bathtub toys or stuffed animals and stick them in the cockpit. Their creations are certainly unique, but there is another way.

For this application, I attached a block of foam to the bottom of the Williams figure because he wasn't tall enough to see over the instrument panel. A block of balsa can be used for the same purpose. To prepare him for the next step in his transformation from William to Wilhelm, file or sand off the flashing around the plastic. Then shape the foam block and blend it with the plastic to form a "body."

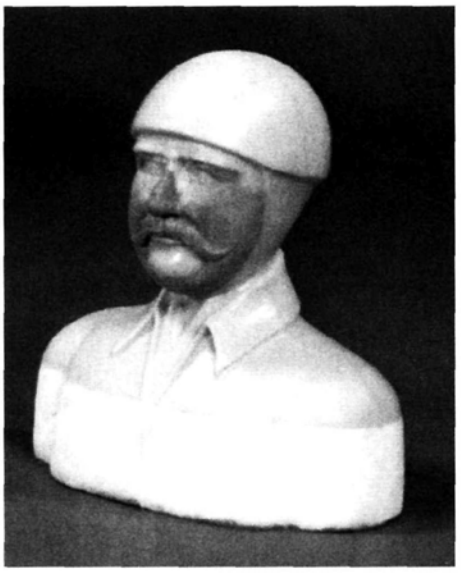
Use some balsa filler and a couple of coats of epoxy or finishing resin to give the foam a smooth surface for sanding prior to painting.



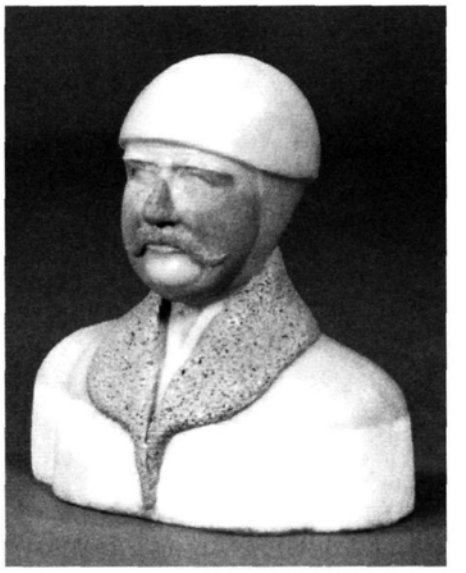
PHOTOS BY FAYE STILLEY

2 The original pilot figure has a nose that would look cute on a teenage girl but is hardly suitable for a fighter pilot, so I built him a proboscis that a man could be proud of out of Epoxolite—a two-part epoxy putty made by Sig Mfg. Co. As it cures, it takes on the consistency of modeling clay and can be molded into just about any shape you can think of. He also had eyes that were shaped more like those in an Egyptian wall painting than any human's I've ever seen. I added eyelids and some character lines at the outside corners. Epoxolite enables you to be as creative as you like. If you don't get it quite right the first time, it can be carved, sanded, or filed into shape after it cures.

3 The transformation continues. The original figure has a smooth, heart-shaped face like you would expect to find on a nine-year-old—just not manly enough for a WW I pilot. Again I used Epoxolite to fill out the face and add a double chin (I figured that between missions these guys enjoyed a lot of schnitzel and beer!). Simply put an approximate amount of putty on the area that you want to change. After a few minutes of cure time, you can shape it with a wet finger or tool (any device you think is the right size and shape). I used toothpicks, Popsicle sticks, a small pocketknife blade, a no. 11 hobby blade and a plastic coffee stirrer, but it is important to keep whichever tool you use wet as you shape the putty.



After I got his face and chin filled out, he just looked like a fat guy wearing a helmet with a tight chin strap—not macho enough to be a rugged fighter pilot. I decided an old-fashioned "soup-strainer" mustache would give the look I wanted. It was simple to make; I just rolled some Epoxolite on a piece of plastic sandwich wrap until I had something that looked like a long hot dog with pointed ends. I rolled it on plastic wrap because Epoxolite is very sticky stuff until it cures, but with the help of some water, you can get it off plastic. Then I just stuck it into place, positioned it with a wet toothpick and trimmed off the ends with a hobby knife. When the Epoxolite was nearly cured, I used a wet no. 11 knife blade to make "hair" lines.

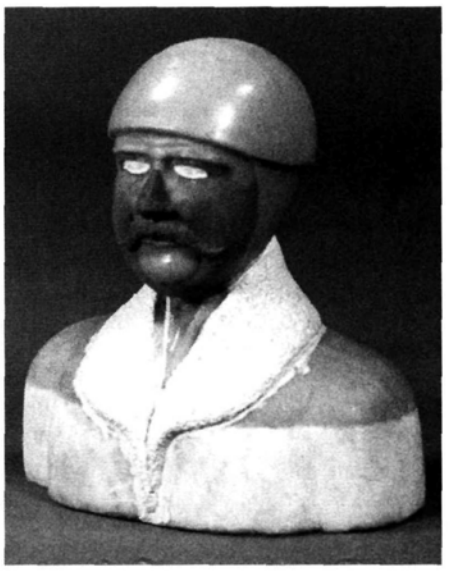


4 The original figure was wearing a long collared shirt, like something you'd expect to see on Elvis in the 1960s. No pilot in his right mind would fly an open-cockpit airplane wearing an unbuttoned shirt with long collars—they would whip around in the wind and beat his face bloody. I built a nice, big, lamb's wool collar that he could pull up around his face on those cold early-morning missions out of a few more globs of Epoxolite smoothed with a wet knife blade. Just before the putty became completely hard, I wrapped eight pins with tape and "prickled" the whole thing to simulate the texture of lamb's wool. Compare this picture with step 1, and you can see how a little putty can add a lot of character to just another pretty face. William has now made the complete transformation to Wilhelm. A paint job is all that is needed to make him flight-ready.

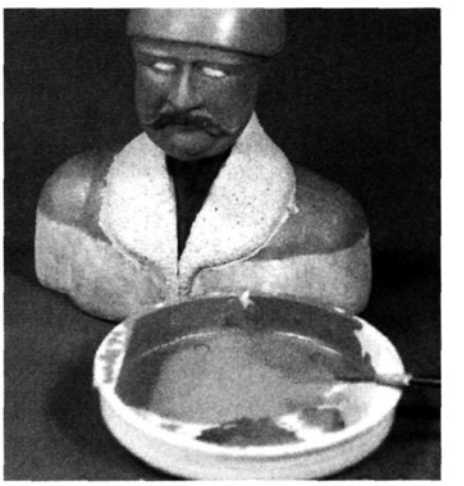
PAINTING THE PILOT

A good paint job on a pilot figure can enhance the overall appearance of any airplane. On the other hand, it can also spoil an otherwise good-looking model. The first step is to get yourself the proper supplies; a few colors of paint and some brushes are all that you'll need, and since hobby paints are available in very small containers, you don't have to buy large quantities or spend big bucks. There are many brands to choose from in all sorts of pre-mixed colors. The largest selection can be found in hobby stores that sell plastic models. "Flat" paints (as opposed to "glossy" paints) are most useful for painting pilot figures because people and their clothes are not usually shiny, though you may want gloss paints for eyes or buttons. You'll need a few small brushes as well; I used sizes 10/0, 5/0, 00 and some ordinary small brushes. Once you've stocked up, it's time to start painting.

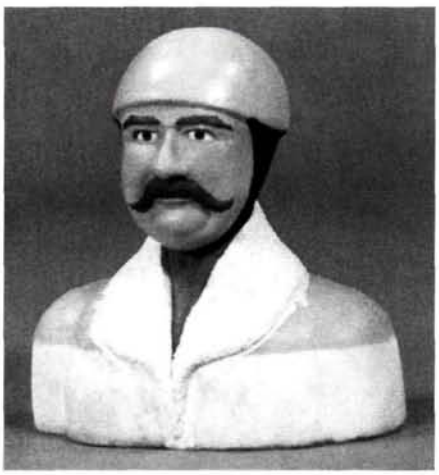
5 Apply the lightest colors first. Any overlap onto an unpainted area can later be covered with a darker color. To speed up the process, I apply two or three colors at a time. This works well as long as you have a dry spot to hold onto and the paints don't touch each other when wet. I painted the eyes glossy white tinted slightly with black to achieve a very light gray. (Most people don't have refrigerator-white eyeballs.) I painted the collar flat white tinted with a little flat yellow and flat brown to simulate the color of lamb's wool.



6 More colors have been added to the figure. The face actually has four different shades of skin color. People's faces are not all one color; cheeks and lips are redder, while the forehead and bridge of the nose appear lighter because of overhead light. First I applied the face color—a combination of flat white, flat red and flat yellow (the color in the center of the mixing dish). While the face was still wet, I added a small amount of white to get a lighter color for the bridge of the nose. Then, I mixed in a little extra red to get the cheek color (that color is in the upper right part of the mixing dish). Even more red was added to get the lip color at the bottom of the dish. The face paint doesn't touch the scarf, so I was able to apply the orange color during this step also.



7 After the face paint dried, I added the mustache and eyebrows. Most pre-mixed brown colors are too dark or too reddish to make a realistic medium brown hair color. I lightened the flat brown with flat white for these features. Remember, facial hair is not usually glossy. If you want extra detail for hair, use two shades of color in separate applications; this will create a highlight effect. I also added irises for the eyes; this fellow has blue eyes. If you use light blue paint straight out of the bottle, your pilot will look like a Malamute, since most blue-eyed people really have gray-blue eyes. To get a realistic color, make a light gray by mixing gloss white and gloss black. Then mix the gloss blue until you have a subtle bluish-gray. The same technique can be used for toning down brown paint for brown eyes. When painting the iris of the eye, don't make it a round ball. The eye's iris is partially hidden by the eyelids. It appears almost flat on top and slightly flat on the bottom. Take a look in the mirror to see what I mean.



After the irises have dried, it's time to add pupils using gloss black. The pupils are round and are positioned in the center of the iris. Wilhelm also needed eyelashes; he'd look strange without them. A thin brown line on the upper eyelid simulates eyelashes. I also added a small pink spot to the inside corner of each eye. The eyelashes, pupil and the corner spot really brighten up the eyes and make this plastic dummy look much more realistic. I also added the leather part of the helmet at this sitting. It is a mixture of flat black and flat brown to simulate old leather.

8 Here is Wilhelm, almost ready to go flying. I added the helmet and coat colors at different times because I needed a dry place to hold on to while I painted. While I was waiting for one color to dry, I painted the goggles. The coat is an olive color made by mixing flat brown and flat green. The helmet is glossy black because I wanted it to be shiny. If you look closely, you will notice that I added a small white dot to the upper corner of each iris. This simulates the light reflection that we usually see in people's eyes.

One last note on paint: this type of hobby paint is not fuel-proof. If you intend to mount your pilot figure in an open cockpit, you should give the flat colors a coat of clear flat urethane and the glossy colors a coat of clear glossy urethane.

9 After you have played with Epoxolite a few times, you may want to try making likenesses of your friends, or maybe even yourself. This is a Latex pilot figure from Hangar 9 that I puttied up to resemble me: wrinkles, bags and all. If you do make a likeness of yourself, I must caution you: don't make it prettier than you really are, or you'll never hear the end of it.

If all this seems a little time-consuming, you might find someone in the household who would like to help with this hobby. Those human beings who paint their faces and nails regularly are usually pretty adept at this kind of work. Either way, the time it takes to make a realistic-looking pilot contributes a great deal to your airplane's overall appearance. If anyone accuses you of playing with dolls, don't get angry. Just take a look at what that person is flying, and consider the source of the comment.

***Sig Mfg. Co.**, 401-7 S. Front St., Montezuma, IA 50171; (641) 623-0215; www.sigmfg.com.*

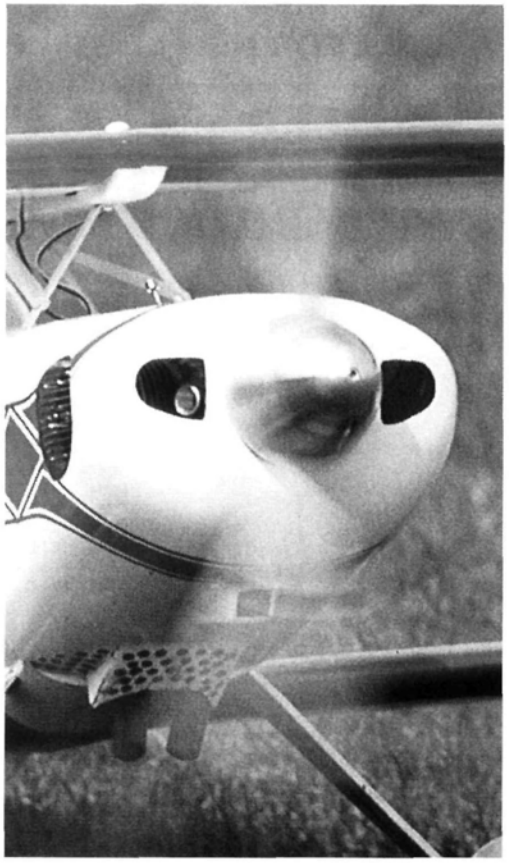
***Hangar 9**; distributed by Horizon Hobby Inc., 4105 Fieldstone RD., Champaign, IL 61822; (217) 355-9511.*

***Williams Bros.**, 119 Los Olivos Ave., Los Osos, CA 93402; (805) 534-1307.* ✈

Choose the right prop for your engine

Understanding torque, brake horsepower and thrust

by Andy Lennon



For best flight performance of sport or scale model airplanes, the propeller diameter and pitch should match the characteristics of both the airplane and its engine. The fine engine reviews by Mike Billinton, Dave Gierke and the late Peter Chinn published in *Model Airplane News* provide complete details on engine performance. The MDS engine in Figure 1 is an example; it appeared in "The Right Combination" (August 2000 issue). The table "MDS .46 rpm on standard propellers" is self-explanatory, but it provides only half the performance picture; the Bhp curve (upper) and the torque curve (lower) give the other half.

In my experience, few modelers understand the significance of these two curves, and even fewer use either in propeller selection. There is also some confusion about which curve to use—torque or Bhp. I hope what follows will explain both curves and which to use for prop selection.

• **Torque.** Torque is the elemental force that rotates the prop. In Figure 1, the MDS .46 RC engine's maximum torque is 75 oz.-in. at 9,798rpm with a standard silencer, as measured on a dynamometer. The torque load imposed on the engine by various diameters, pitches and makes of propellers is marked on the torque curve. The 12x6 Graupner prop spins at 9,780rpm and demands the maximum torque. Larger props would overload the engine and cause a reduction in both torque and Bhp—as indicated by the steep downward slope of the torque curve to the left—and risk overheating the engine.

To the right, smaller prop sizes demand progressively less torque from the engine, permitting increased rpm. A 9x4 Zinger prop turns just under 18,000rpm; this corresponds to just over 60 oz.-in. of torque.

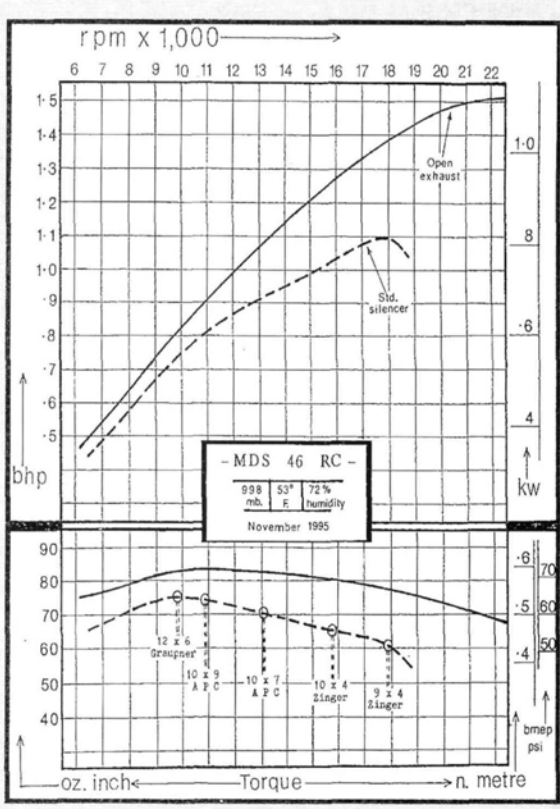
• **Brake horsepower (Bhp).** This calculated figure reflects force over time. Dave Gierke's Bhp formula is:

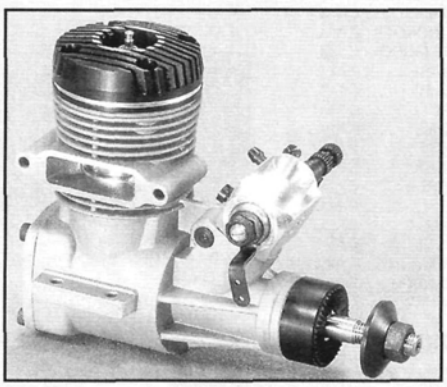
$$\text{Bhp} = \frac{\text{torque (oz.-in.)} \times \text{rpm}}{1{,}008{,}000}$$

[Note: this is an approximation. The exact figure to divide by is actually 1,008,384; it has been rounded off for simplicity.]

As torque demand diminishes with the size of the prop, the engine can spin more rpm. As long as the rpm increase at a greater rate than the torque declines, the engine's Bhp (as calculated above) will continue to climb. At some point, this figure will peak—specifically, when the rate of torque decline

Figure 1.





MDS .46 rpm on standard propellers

Prop	Open exhaust	Std. silencer
15x6 Airflow	6,200	—
13x6 MK	9,260	—
12x6 Graupner	10,200	9,780
10x9 APC	11,200	10,710
10x6 MK	13,240	12,320
10x7 APC	13,690	13,010
10x4 Zinger	16,460	15,760

Figure 2.

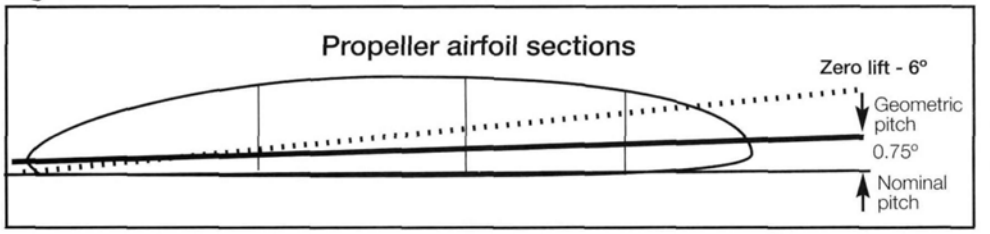
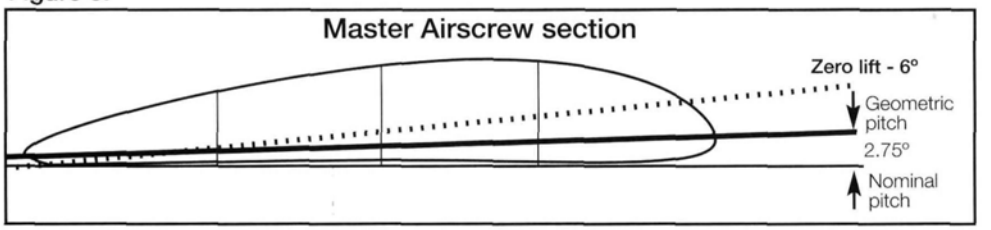


Figure 3.



begins to exceed the rate of rpm increase. The engine in Figure 1 peaks at 1.1 Bhp and 18,000rpm, which is the speed at which it spins the 9x4 Zinger prop.

• **Thrust.** An engine and propeller generate thrust by blasting a column of air backward to propel the airplane forward. It is a logical conclusion that the thrust thus generated is proportional to the volume of air per minute being blasted back. The greater that volume, the greater the thrust and vice versa. The volume per minute is easily estimated by multiplying the area of the prop disc (in square inches) by the static rpm and again by the nominal pitch. Disc area can be calculated with the following formula:

$$\text{Disc area} = \frac{\text{prop diameter}^2 \times \text{pi } (3.1416)}{4}$$

Or, simply, prop diameter^2 x 0.7854. Thus, the formula for air volume per minute is:

Volume per minute = diameter^2 x .7854 x rpm x nominal pitch

For the APC 10x9 prop at 10,710rpm, the air volume is:

10^2 x .7854 x 10,710 x 9 = 7.57 million ci/min.

This air-volume-per-minute figure is conservative. In-flight rpm are higher than static rpm, and on some propellers, the true (or geometric) pitch is higher than the nominal pitch (see Figures 2 and 3).

• **Comparison of torque vs. Bhp.** From the many engines reviewed in *Model Airplane News*, I selected four that ranged from .46 to 1.5ci. In addition to the MDS unit in Figure 1, I chose the SuperTigre G90 (Figure 4, from the December 1996 issue), the Webra Speed 1.20 (Figure 5, from the October 1994 issue) and the Irvine 1.50 (Figure 6, from the January 1996 issue).

For each engine, the air volume per minute was calculated in two ways; for prop diameter/pitch at or close to the rpm where peak torque occurs, and for prop diameter/pitch at or close to the rpm where peak Bhp occurs. The results are shown in Table 1.

Obviously, "propping" the engine near its peak torque range produces the greater volume of air per minute, and, therefore, the greater thrust.

• **The model.** In Table 1, the prop sizes listed opposite "torque" match the engine's performance characteristics, but more than likely, they will not match the *model's* performance characteristics (see "The Right Combination"). Models with lower wing loadings require props of larger diameter and lower pitch to match their lower flying speeds. Models with higher wing loadings fly faster and need smaller-diameter, higher-pitch props. For best results, however, both props should load the engine into its peak torque range.

This is where Dave Gierke's "propeller load factor" (PLF) formula (July 1999 *Model Airplane News*) is very useful. Note that his formula should be limited to families of props from specific manufacturers.

PLF = diameter^2 x pitch

Its usefulness is best described by examining, as a practical example, the SuperTigre G90 engine with the ST Quiet Muffler (Figure 5). The APC 14x14 prop most closely matches the peak torque because it spins at

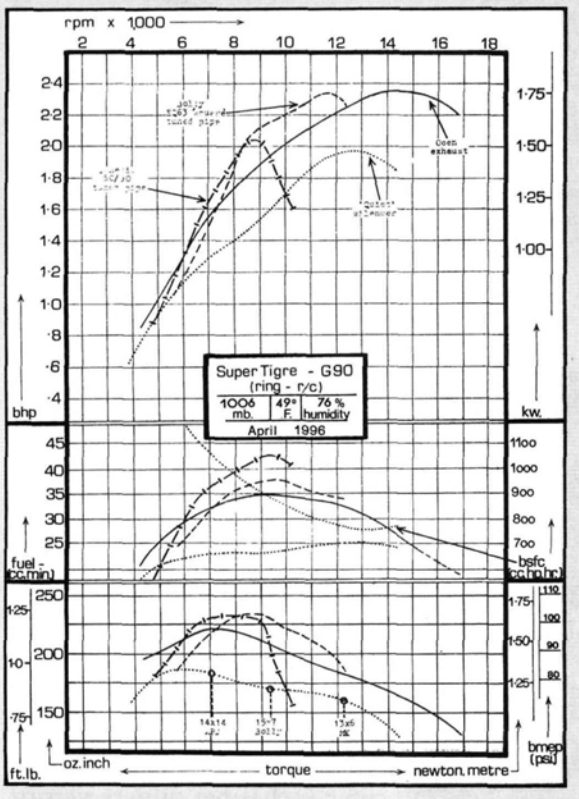


Figure 4.

RPM ON STANDARD PROPELLERS

	OPEN EXHAUST	ST QUIET MUFFLER	GENESIS PIPE @ 510MM	BOLLY PIPE @ 480MM
18x7 Mastro	6,160	5,605	—	—
14x14 APC	7,865	7,060	7,960	7,820
16x6 Merati	8,360	7,600	8,640	—
15x8 Graupner	9,060	8,360	—	—
16x6 Airflow	9,230	8,540	9,100	9,460
15x8 APC	9,440	8,640	—	—
16x5 Zinger	9,680	8,940	—	—
13x10.5 MK	9,900	9,080	—	—
15x7 Bolly	—	9,290	—	10,291
15x6 Airflow	10,140	9,370	9,600	—
14x7 Graupner	10,220	9,580	—	—
12x12 APC	10,550	9,790	9,740	10,930
13x6 MK	12,770	12,250	11,200	12,430
12x6 Mastro	13,140	12,550	—	—
10.5x8 Bolly	—	14,760	—	—
11x7 APC	14,960	14,180	—	—
10x6 MK	15,080	—	—	—

7,060rpm. By placing a straightedge on the points corresponding to pitch and rpm on the rpm/speed/pitch nomograph (Figure 7), the level flight speed is shown to be 115mph. For a model that has a moderate wing loading of 20 ounces per square foot and a level-flight speed of 80mph at the same 7,060rpm, the nomograph indicates a prop pitch of 10 inches and, obviously, a larger diameter.

Consulting the catalog for available APC 10-inch-pitch props, I found a 15x10 and a 16x10. I also found 16x8 and 16x12 sizes. Plugging these dimensions into Dave Gierke's PLF formula, along with those for the original 14x14 prop, we get the following values:

Prop	PLF
14x14	2744
15x10	2250
16x10	2560
16x8	2048
16x12	3072

The APC 16x10's PLF of 2,560 is closest to the 14x14's value of 2,744 and would be a good choice. However, consider also the APC 16x12.

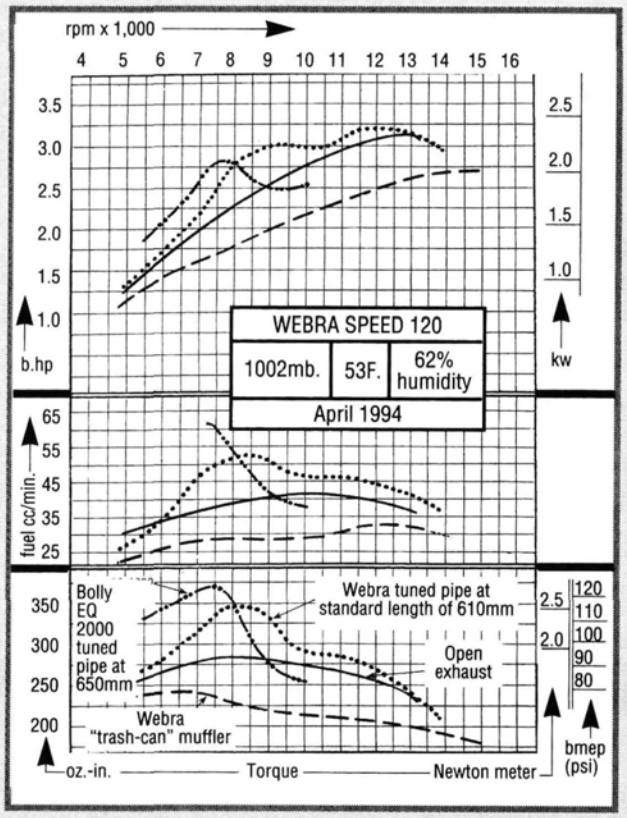
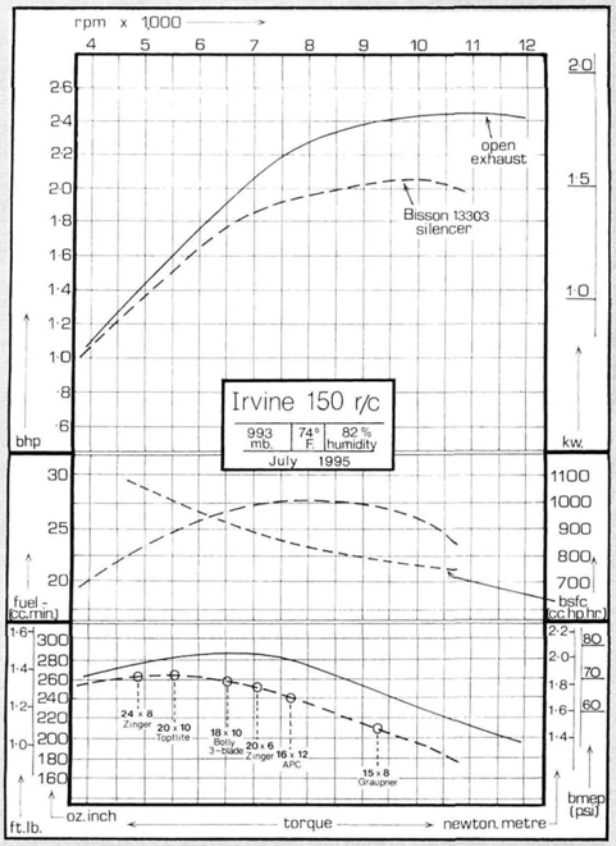


Figure 5.

RPM ON STANDARD PROPS

	OPEN EXHAUST	W/"TRASH CAN" MUFFLER	SLIMLINE MUFFLER	W/TUNED PIPE @ 610mm	BOLLY EQ 2000 T/PIPE @ 650mm
20x10 Mastro	4,748	4,576	4,710	4,875	5,407
24x8 Zinger	4,903	4,420	—	4,615	5,258
20x8 Top Flite	6,783	6,052	6,052	6,580	7,340
18x7 Mastro	7,040	6,563	—	7,627	7,758
18x8 Merati	7,251	6,497	—	7,489	7,754
20x6 Zinger	7,350	6,907	—	7,930	8,010
16x12 APC	8,012	7,474	7,474	8,680	8,370
14x14 APC	8,560	7,810	—	9,139	8,700
15x8 Graupner	10,150	9,261	—	10,484	9,866
15x8 APC	10,360	9,569	9,966	10,484	10,145

Figure 6.



RPM ON STANDARD PROPS

	OPEN EXHAUST	BISSON 13303 MUFFLER
22x10 Menz	–	4,395
24x8 Zinger	4,840	4,710
20x10 Menz	–	5,290
20x10 Top Flite	–	5,540
18x12 Menz	–	5,920
20x8 Top Flite	6,650	6,510
18x10 Bolly (3-blade)	6,720	6,550
18x7 Mastro	–	6,760
20x6 Zinger	–	7,120
16x12 APC	7,720	7,535
15x8 Graupner	9,560	9,280

Since there is a direct relationship between PLF and rpm, it is easy to estimate the rpm that the new props will turn based on their calculated PLFs and the rpm of the original 14x14 prop. With a PLF of 3,072, the 16x12 would spin at an estimated 6,300rpm. Looking at the torque curve in Figure 4, you can see that 6,300 is just as close, if not closer, to the peak of the torque curve. Plotting 6,300rpm and the 12-inch pitch on the nomograph in Figure 7, level-flight speed would be 85mph. Using the formula from above, air volume would be 15.2 million cubic inches per minute versus

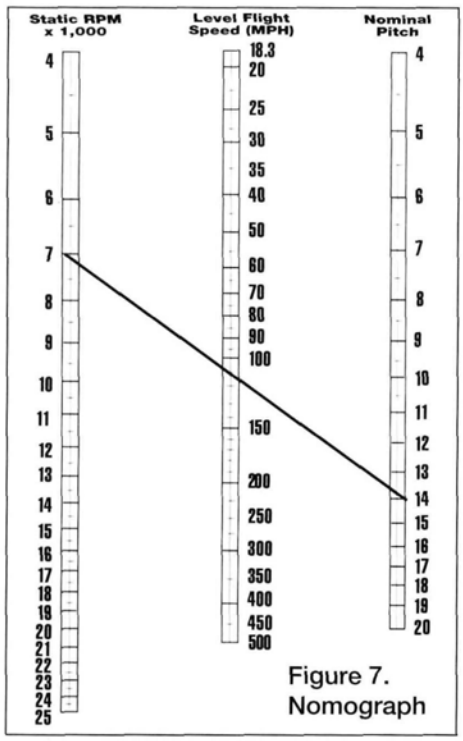


Figure 7. Nomograph

14.4 million cubic inches per minute for the APC 16x10 prop.

• **Propellers.** All currently available prop makes are good, but some are "gooder" than others. I've had success with APC props on many models. Consider the props in Figure 1; the closest to the torque curve peak are a 12x6 Graupner (9,780rpm) and the APC 10x9 (10,710rpm). Calculated air volume for the Graupner is 6.63 million ci/minute; for the APC it is 7.57 million ci/minute.

• **Tuned pipes.** Tuned pipes dramatically improve both maximum torque and rpm by, as Dave Gierke succinctly puts it, "supercharging" the engine. This is illustrated in Figures 4 and 5. For models with marginal power, or if you are in need of greater speed, consider a tuned pipe.

• **Theoretical versus practical.** I have been in contact with two local modelers who both fly models powered by the SuperTigre G90 with Quiet Muffler. Neither had read Mike Billinton's review of this engine in the December 1996 *Model Airplane News*, so they were unaware that the G90 developed its maximum torque of 186 oz.-in. at just under 6,000rpm to meet FAI noise standards. Both used props at or near 13 inches in diameter with 6-inch pitches, spinning at between 11,000 and 12,000rpm.

Modeler no. 1 flies a pattern ship and prefers relaxed flying at moderate speeds. He was surprised at the G90's low rpm at maximum torque; he tried 16x6 props and liked the results. Modeler no. 2 flies a scale P47D Thunderbolt with 713 square inches of wing area. He test-flew seven propellers and found that the 16x8 APC prop at 7,200rpm produced the best overall result. Takeoff runs were short; climb was much improved; the engine idled reliably at lower rpm, and the model was surprisingly quiet in flight.

CONCLUSION

Engine advertisements often quote performance figures such as "1.3hp at 16,000rpm," but these have little value for prop selection. If the ads read "150 oz.-in. of torque at 10,000rpm turning a 10x9 prop," they would be more useful. Nevertheless, I hope the information contained here will help you to understand the relationship between torque, horsepower, thrust and prop selection. A little time spent crunching numbers can produce some surprising results at the field. Good luck!

I'd like to thank Marc Brady and Xavier Mouraux for their help, and Chris Trump, who flew many test flights over several weekends. A special thanks to fellow author Dave Gierke for his friendship and advice.

Table 1: Comparison of Air Volume

TORQUE VS. BRAKE HORSEPOWER

Engine and displacement	Torque vs. Bhp	Propeller	Diameter	Pitch	Rpm of peak	Air volume in millions of ci/min.	Percentage of peak volume
Fig. 1: MDS .46 RC w/std. silencer	Torque	APC	10	9	10,710	7.57	100%
	Bhp	Zinger	9	4	17,900	4.55	60%
Fig. 4: SuperTigre G90	Torque	APC	14	14	7,060	15.21	100%
	Bhp	APC	11	7	14,180	9.43	62%
Fig. 5: Webra Speed 120 w/610mm tuned pipe	Torque	APC	14	14	9,139	19.69	100%
	Bhp	APC	15	8	10,484	14.82	75%
Fig. 6: Irvine 1.50	Torque	Top Flite	20	10	5,290	16.61	100%
	Bhp	Graupner	15	8	9,280	13.11	79%

MODEL AIRPLANE NEWS
PRODUCT
REVIEW

A programmable ESC for brushless motors

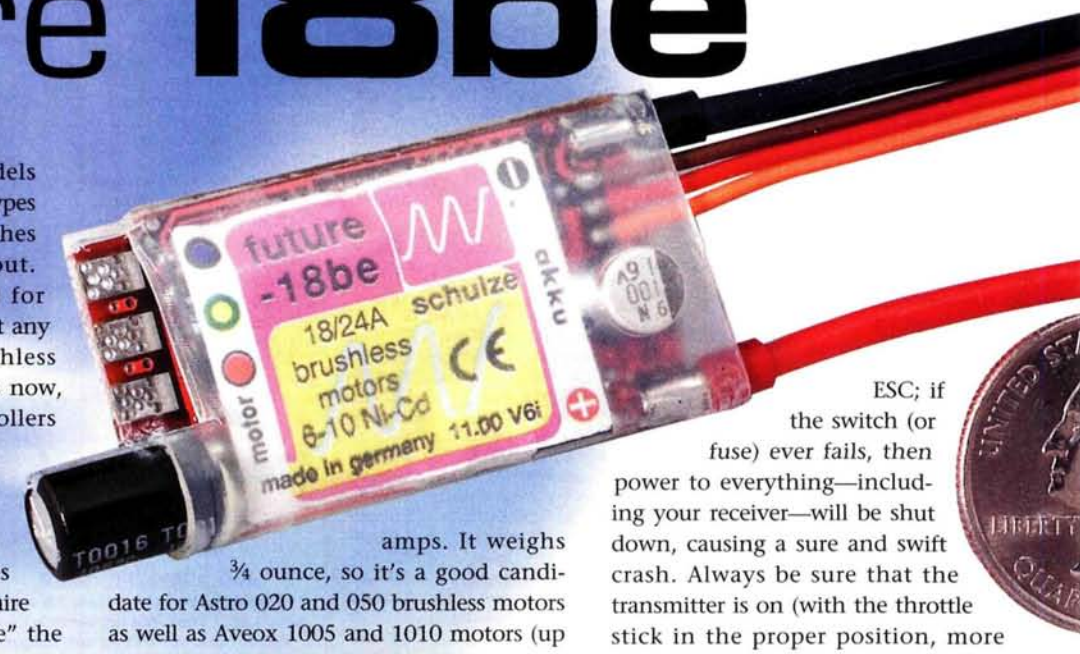
SCHULZE Future 18be

by Tom Hunt

To pull or push our electric models around the sky, we use two basic types of electric motors: those with brushes (usually carbon) and those without. Electronic speed controls (ESCs) for brushed motors can "drive" just about any motor. Although we've used brushless motors in the hobby for some years now, aftermarket brushless motor controllers have only recently been designed and produced. Previously, you bought a brushless motor and ESC as a pair from the manufacturer.

The ESCs in Schulze's Future series are "sensorless," i.e., they do not require a sensor inside the motor to "excite" the proper winding to rotate the shaft. The ESC "senses" rotor position via three main power leads from the ESC to the motor. This requires a more complex software but it does reduce the parts count, so these ESCs are smaller and lighter than "sensor"-type brushless ESCs.

Schulze's 18be is the smallest, lightest airborne unit in its Future line of sensorless, brushless ESCs. It is capable of handling from 6 to 10 cells and steady-state currents of 18 amps, with short bursts up to 24 amps. It weighs ¾ ounce, so it's a good candidate for Astro 020 and 050 brushless motors as well as Aveox 1005 and 1010 motors (up to its current and cell-count limitations). The 18be features a battery eliminator circuit (BEC) as well as thermal, over-amp and over-speed protection. It will shut the motor down if any of these parameters are exceeded. The ESC will also disarm itself if signal to the receiver is lost. It does not, however, have any reverse polarity protection (input side), so do not hook it up backward to the battery, or you will let all the smoke out!



SPECIFICATIONS

Model name: Future 18be

Manufacturer: Schulze

Distributor: RC Direct

Type: programmable sensorless, brushless ESC

Capacity: from 6 to 10 cells; 18A steady-state current w/short bursts up to 24 amps

Dimensions: 2x1x0.40 in.

Weight: ¾ oz.

Price: $119.99

Features: BEC as well as thermal, over-amp and over-speed protection; can be programmed for brake, no-brake and belt-drive (soft start with a brake option) modes; comes with 28-page instruction manual.

INSTALLATION AND USE

Much of the 28-page instructions that come with the 18be is general information, but the novice electrics fliers should carefully read every word! There are many good "handling" tips that apply to *any* ESC in *any* model.

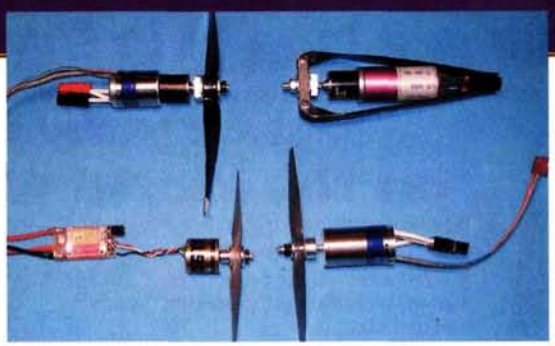
Installation couldn't be simpler. Put your favorite connector on the ESC's black and red wires (you'll later attach these to your battery). On the other end of the controller, solder the motor wires to three leads (larger, higher-current Future controllers are supplied with large-gauge, gold-plated pins that you solder your motor to then insert into receptacles in the controller). Plug the three-wire lead into the throttle channel of the receiver. Power is delivered to the ESC as soon as you plug the motor battery in; no switch is provided. It is *not* a good idea to put a switch (or arming fuse) in the line between the battery and a BEC-equipped ESC; if the switch (or fuse) ever fails, then power to everything—including your receiver—will be shut down, causing a sure and swift crash. Always be sure that the transmitter is on (with the throttle stick in the proper position, more about this later) when you plug in the battery pack. If the motor runs backward at first, simply reverse the two outside leads.

After you've made all of the connections, you can program the ESC. The steps are nicely outlined in the manual. Unfortunately, the program is not stored in the controller. The setup, though quick and easy, must be done before each flight. The 18be has three basic modes: brake, no brake and belt drive (soft start with a brake option). Each step starts with the throttle stick in a different position.

FLIGHT TESTS

I tried the 18be on four motors: an Aveox 1010-3y direct drive, an Aveox 1005-2y with 4.4/1 Maxon planetary gearbox, a Hacker 10-WI-L with Maxon 4.4/1 planetary box and an AstroFlight 010. I installed props that drew 15 to 18 amps at full throttle on 7 cells for all except the Astro 010. In that case, I used the supplied APC 5.5x2.5, which draws about 3.5 amps. I looked for starting characteristics, braking torque and general throttle response.

• **Aveox 1010-3y; Cox fixed 6x4 prop.** Connecting the 18be to the 1010-3y direct drive allowed me to investigate startup without the slight drag of a gearbox and the mass of a larger prop. On starting the motor, I observed that it took a fair amount of stick



Clockwise from left: Aveox 1010-2y/Maxon gearbox; Hacker 10-WI-L/Maxon gearbox; Aveox 1010-3y; Astro 010 with Schulze controller attached.

motion for it to start turning. The motor hesitated and jittered without sufficient power applied to get it to turn in the correct direction. When it was running, the motor could be reduced to lower rpm. Throttle response was very good and quite linear throughout the entire range of stick travel. The brake action is positive, but not violent.

• **Aveox 1005-2y/Maxon 4.4:1 gearbox; Graupner fixed slim 8x4 prop.** As in the direct-drive setup with the much smaller prop, significant power must be applied to get the motor to turn, then it can be throttled back if required. I did notice, however, that the drag of the gearbox and the higher mass prop did not significantly change the point at which the motor would begin to run. With the larger prop and gearbox, the effect of the brake is much more noticeable but, again, not so violent that you fear loosening your motor mount or spitting off the prop, which I have seen happen with other ESCs.

• **Hacker 10-WI-L/Maxon 4.4:1 gearbox; Graupner 13x7 folding Cam prop.** This is a significantly larger motor than the Aveox 1005. Also sporting the Maxon 4.4:1 gearbox, the Hacker motor requires a much larger prop on 7 cells to produce any power. Again, a significant advance in throttle was required to start the motor (no more than the other two required, though). The motor has no "cogging" torque to overcome as the Aveox motors do. The larger, heavier prop and the gearbox did not appear to influence the start-up whatsoever.

• **AstroFlight 010; APC 5.5x2.5 prop.** At the time of this writing, Bob Boucher of AstroFlight did not yet offer a throttle for the 010 and instead supplies an on/off-type controller for the motor. The 18Be is not much larger than the stock Astro controller, and it's only heavier because of the heavy-gauge wire on the "battery" side. If you replace this wire with shorter, lighter-gauge wire and reduce the length of the wire to the receiver, the 18be would be a fine substitution for the stock on/off controller. I did notice that it took a bit more "stick" to get the motor to start, but after that, the 18be provided very smooth throttle for the 010.

Most of the 18be's startup idiosyncrasies practically disappear in flight with a fixed prop, as the airflow past the prop imparts a torque that makes startup immediate and smooth as soon as the brake is off (usually the first click off the bottom of the throttle stick). Even with folding props, the motor still wants to start quickly and smoothly as soon as even the slightest power is applied.

I plan to take advantage of the 18be's capability to drive more than one brushless motor at a time when the motors are set up in a parallel circuit. This does have one disadvantage, though: the ESC must be able to handle twice the current. In the case of the Future 18be, you can only draw about 9 amps per motor. This may be an under-use of many brushless motors, except maybe the Astro 010 or 020. If more current and/or larger motors are used, a Future 25be or 45be might be needed. If BEC is not required, then the Future 45bo could be used.

The Schulze line of sensorless, brushless ESCs is a nice option to the stock units that come with brushless motors, and their small size, programmability and working features make them well-suited to just about any electric model plane.

APC Props; *distributed by Landing Products, 1222 Harter Ave., Woodland, CA 95776; (530) 661-0399; fax (530) 666-6661.*
AstroFlight Inc., *13311 Beach Ave., Marina del Rey, CA 90292; (310) 821-6242; fax (310) 822-6637; www.astroflight.com.*
Aveox Electric Flight Systems, *31324 Via Colinas, #103, Westlake Village, CA 91362; (818) 597-8915; fax (818) 597-0617.*
Cox Hobbies, *P.O. Box 270, Penrose, CO 81240; (719) 372-6565.*
Graupner; *distributed by Hobby Lobby Intl.*
Hacker; *distributed by ICARE Sailplanes, 381 Joseph Huet, Boucherville, Quebec, Canada J4B2C5; (450) 449-9094; icare@telts.com.*
Hobby Lobby Intl., *5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; www.hobby-lobby.com.*
Schulze, distributed by RC Direct, *4444 Convoy Ct., San Diego, CA 92111; (858) 277-4531; fax (858) 560-9695.*

The Northwest Hobby Expo & easy fiberglass parts

One of my favorite activities is attending the Great Northwest Hobby Exposition in Puyallup, just outside Tacoma, WA. Each year, there are new products and many beautiful models on display, and 2001 was no exception. The quality and sheer number of aircraft on display make the Expo a must-see hobby showcase.

STATIC DISPLAY BEAUTIES

This year, Jeremy Fursman won the Best of Show award with his ¼-scale de Havilland Tiger Moth. Built from the Duncan Hutson kit, Jeremy's Laser 1.50 4-stroke-powered Tiger Moth had already won the 2000 Canadian Nationals and placed seventh at last year's U.S. Scale Masters Championship in Columbus, OH. I was very impressed by his documentation; it was simple yet thorough—something I have always advocated. What I found even more interesting was that Jeremy brush-painted his model using the new water-based System Three paint from Nelson Hobby Specialties. There wasn't a brush mark to be seen, and I think you'll agree that its "Tony the Tiger" paint job is a real eye-catcher.

New from Hoemcraft Aviation is this 1/5-scale de Havilland Chipmunk. This 80-inch-span, 1.20 model is available through Nelson Hobby Specialties.

Another beautiful model was Wendell Ward's version of the A6M 3 Model 32 Zero. Expertly built from an old Bert Baker kit, it had rivets, panel lines, a sliding canopy, detailed cockpit, etc., and was finished with Perfect Paints. Under the hood is an Enya VT-240 twin.

Jeremy Fursman won Best in Show with his ¼-scale Tiger Moth. Highly unusual paint scheme, don't you think?

This Bert Baker Zero is the work of Wendell Ward. Notice the fine rivets and panel-line details.

NEW PRODUCTS

The newest company I found producing sport and scale wooden kits is Hoemcraft Aviation. Merle Hoem, company owner and airplane designer, offers a great-looking 1/5-scale de Havilland Chipmunk through Nelson Hobby Specialties. This balsa-and-ply kit includes some built parts: the sheet plywood doublers and fuselage sides are joined at the factory to maintain the correct fuselage curve; the fuselage side sheeting is ready to install. The kit has laser-cut parts and specific guide holes in the fuselage sides to ensure accurate parts alignment. It includes Nelson Hobby Specialties hardware.

Proctor Enterprises displayed a number of its WW I kits, and the ¼-scale Fokker D-VII kit is still the most popular in its inventory. I was pleased to hear that Proctor now offers a prefabricated ¼-scale SPAD XIII! Manufactured by Flugenmodelbau—the company in Germany that makes the ¼-scale WACO that Proctor offers—the Peter Barth-designed SPAD is a true ARF and comes built and finished in a scale color scheme. This model is also available as a kit.

Jet Hangar Hobbies (JHH) displayed a prototype of the RAM 500 turbine engine and showed how well it fits in its ducted-fan models. It also displayed other kits designed around 5-inch-diameter fan units. This new turbine weighs only 1.5 pounds, and it can be set up at the factory for a specified thrust of up to 11 pounds. JHH offers plans that tell you how to

Larry Wolfe of Jet Hangar Hobbies was on hand with his line of scale ducted-fan jets and accessories. Larry also showed how well the new RAM 500 turbine fits his models.

upgrade its kits for turbine power. JHH also offers custom-made scale landing-gear struts for its kits. These shock-absorbing Oleo-strut units will also work nicely with other kits.

Arizona Model Aircrafters also offers scale WW I ARFs. The ⅕-scale Fokker Dr.1 has a fabric-and-painted finish and will be available with a dummy rotary engine and machine guns. Its out-of-the-box weight is only 4 pounds, so it should be ideal for electric and glow power; and best of all, it costs only $295 plus shipping. Now that's a bargain!

Arizona Model Aircrafters has entered the WW I ARF market with some very interesting classic models. Shown here are the company's ⅕-scale Fokker triplane and a ⅓-scale Fokker Eindecker.

Arizona Model Aircrafters also displayed a ⅓-scale Fokker Eindecker and a Sommers monoplane. The Sommers came from an idea that company owner Jaime Johnson has for the development of

TECHNIQUE OF THE MONTH

Quickie Fiberglass Parts

I use the West System epoxy resin to make fiberglass parts. The paste wax prevents the parts from sticking to the plug.

This month's technique is how to make fiberglass parts without having to first make a female mold. Using fiberglass parts to make blisters, cowls and other large scale items saves the weight of heavy, carved-balsa blocks. And using a plug (a male mold) to directly make your part saves the time and effort needed to produce a female mold.

I wanted to make the large machine-gun blisters that are so obvious on the Me-109G model I am building. To start, I built two balsa blisters that fit nicely into place just in front of the cockpit. I took my time and made them as smooth as I could; then I sealed them with resin and primed them. I sanded the finish smooth with 400-grit paper.

I then coated the two plugs with Johnson's paste wax to prevent the fiberglass cloth and resin from sticking to them. Apply at least four heavy coats, and buff each coat after it dries. Make sure to cover the entire surface of your plug.

Cut the glass cloth pieces slightly larger than your plug. I use one layer of 2-ounce cloth, two layers of 1-ounce cloth and three layers of 0.75-ounce cloth. The heaviest cloth may have to be cut in a few places to help it lie flat against the plug's surface.

Mix up some epoxy finishing resin (I use West System) and apply it to the plug. Place the 2-ounce cloth on the plug. Don't worry about fully saturating this layer with resin, because as you add the other layers of cloth and resin, the resin will fully impregnate all the layers. Start adding the rest of the layers, and keep each layer as smooth as you can make it. End the process by adding the 0.75-ounce layers.

These are the wooden plugs I made for the blisters I wanted to add to my Me-109G. Notice that I used a fair amount of filler and primer in these balsa parts to make them smooth.

Liberally apply at least four coats of paste wax to the plugs before you add the fiberglass cloth and resin.

After all the resin has cured, you can remove the part from the plug and trim it to shape. Use the plug's shape as a guide.

The completed fiberglass blisters ready for priming.

The primed blisters in place on the Me-109G fuselage. Once they have been glued into place and faired in with filler putty, the model will look great and be only slightly heavier.

After all the layers have been added, use some toilet paper or paper towels to blot the outer surface to remove excess resin. Now let this layup cure over night.

When the part has fully cured, pry it off its plug. It should pop right off. Place the part back on the plug, and use the plug as a guide to trim the part to shape. When you've finished, wash the part with soap and water to remove any wax that might interfere with the gluing or painting of the part. If there are any blemishes or runs to be sanded smooth, place the part back on the plug and use a sanding block and progressively finer paper to smooth the surface.

Another way to use this method is to coat a clear canopy with paste wax and then add a few layers of glass cloth and resin to form canopy frames. When the resin has cured, you could pop the part off the canopy, cut out the unwanted areas and end up with a nicely fitting frame that can be finished, painted and attached over the clear canopy. Since I haven't actually tried this, be sure to buy a spare canopy to mold the framework on, and use only epoxy resin; polyester resin can attack some types of clear plastic.

vintage pylon racing! When I suggested it sounded like the movie "Those Magnificent Men in Their Flying Machines," Jaime chuckled and said he had an idea for that, too! I'll keep you posted if his idea gets off the ground.

UHI showed off its F-100 kit, which has been substantially upgraded since it came out. You now have a choice of a ducted fan or a RAM 500 turbine for power. The fuselage comes in two pieces and with two molded hatches that allow for easy equipment and powerplant access. The elevator and flap assemblies have also been redesigned, as have the landing-gear set-up and the air-intake ducting.

UHI has totally redesigned its F-100 ducted-fan kit, and it is now easier to build. It can also be outfitted with the new RAM 500 turbine.

3 Sea Bees showed off this great-looking SPAD XIII ARF. The beautifully finished model is small enough to transport in one piece.

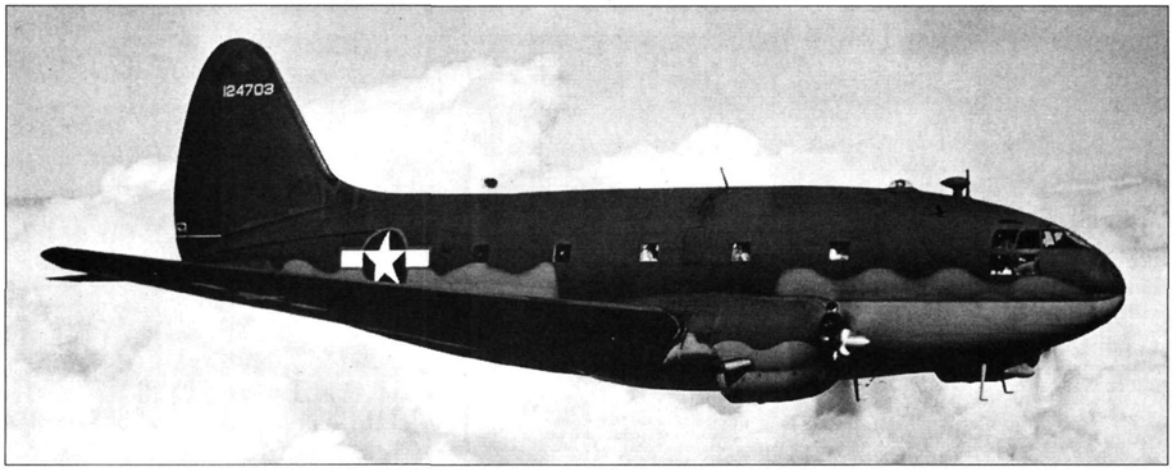
The 3 Sea Bees Models company has seen its business grow immensely. Known for its line of WW I and vintage ARF aircraft, it offers very nicely done, museum-quality aircraft. The models come with wing stitching, wire wheels, leather cockpit edging, dummy engine details, etc. I was impressed by its colorful ⅕-scale SPAD XIII. It has a 69-inch wingspan and is 47 inches long, so it's easy to transport in one piece.

3 Sea Bees Models, *P.O. Box 747, Lake Stevens, WA 98258; (425) 334-6089; fax (425) 397-2126.*
Arizona Model Aircrafters, *14795 N. 78th Way, Unit 800, Scottsdale, AZ 85260; (480) 348-3733; fax (480) 348-3773.*
Enya; *distributed by Altech Marketing, P.O. Box 7182, Edison, NJ 08818-7182.*
Hoemcraft Aviation, *1204 S. 4th, Independence, OR 97123.*
Jet Hangar Hobbies, *P.O. Box 1607, Hawaiian Gardens, CA 90716; (562) 467-0260; fax (562) 467-0261.*
Nelson Hobby Specialties, *394 S.W. 211th Ave., Aloha, OR 97006; toll-free (877) 263-5766; (503) 259-8899; www.nelsonhobby.com.*
Perfect Paint; *distributed by Chevron Hobby Products, P.O. Box 2480, Sandusky, OH 44870.*
Proctor Enterprises, *25450 N.E. Eilers Rd., Aurora, OR 97002; (503) 678-1300; fax (503) 678-1342.*
R.A. Micro Jets, *8222 NW South River Dr., Medley, FL 33166; (305) 863-1970; fax (305) 863-1971.*
West System; *distributed by Composite Structures Technology, P.O. Box 642, Tehachapi, CA 93581-0642; (805) 822-4162; (805) 822-4162.* ✈

NAME THAT PLANE

Can you identify this aircraft?

Send your answer to *Model Airplane News*, **Name that Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.



The winner of the April "Name that Plane" contest is Jeff Grant of Louisville, KY, who correctly identified the Martin A-30 Baltimore. Jeff easily recognized the Baltimore—also known as the Model 187—because he is currently collecting documentation to build an ⅛-scale model of it later this year. The Baltimore was contracted by the British and French in 1940 to meet their requirements for a medium bomber. Subsequently the U.S. Air Force designated it the A-30 (a light attack bomber) and provided planes as part of the Lend-Lease program, though no A-30s were actually flown operationally by the U.S. The Baltimore had a wingspan of 61 feet, 4 inches, a maximum takeoff weight of 27,850 pounds and a maximum level flight speed of 320mph.

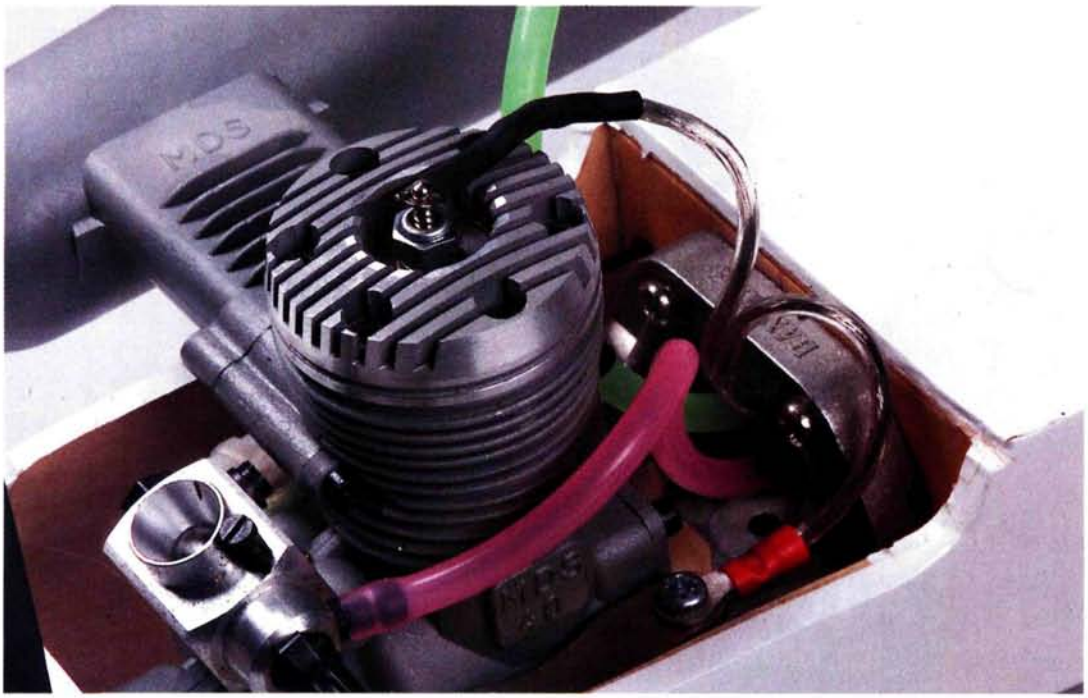
The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.

Make your own remote glow-plug lighter

Safer models in minutes

by Vance Mosher

A lot of people use remote glow-plug lighters these days; they look better and they are safer, and installing one is easier than cutting a hole in the cowl in exactly the right place over the glow plug. This simple and effective technique makes them cheaper, too. Total cost is about $1, and the process is so easy that you can make one in minutes.



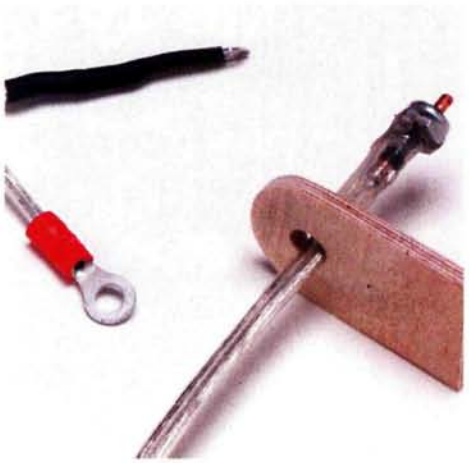
A remote starter adds an extra measure of safety to engine startups; it keeps modelers' fingers away from the prop. That is particularly useful with trainer aircraft such as this Hangar 9 Xtra Easy, whose pilots often have less experience. For scale aircraft, a remote starter means no ugly holes in the cowl.

THE REMOTE END

Split the lamp-cord wires about 2 inches at one end and 3 inches at the other end. Shorten one of the 2-inch wires by about ¾ inch. Strip ¼ inch of insulation off both ends of both wires.

Clamp the no. 6 nut in a vise with the back face showing so that you can solder the long wire from the 2-inch end of the chord to the nut. Use resin-core solder; acid-core solders will eventually eat the wires. Use glass cleaner to clean off excess resin. Be careful not to cover the hole, and don't linger with the soldering iron, or you'll melt the nylon in the nut. Keep the solder off the sides of the nut; they need to be clean to fit your glow-plug lighter. Thread the hard piece of insulated house wire into the back of the no. 6 nut so that about ¼ inch sticks out the top. Cut ⅛ inch of insulation off the top and ¼ inch off the bottom end. Drill out the center of the nut to ⅛ inch if you can't thread the insulated wire into it. Glue the wire into the nut and into its own insulation with thin CA. Solder the remaining lamp-cord wire (the shorter wire) to the hard house-wire end. Fit the wires together smoothly.

A dollar's worth of hardware (see materials list) and a few minutes effort in your workshop are all that you need to make your own remote glow-plug lighter.



A piece of ply supports your remote plug on the fuselage, while a snap link connects the lead to the post to the glow-plug. A simple ring connector on the ground lead fits under one of the motor-mounting bolts.

Glue this assembly into the plywood so that the wires go through the hole. Leave a space between the nut and the plywood. Attach this plywood, or any plat-

form that is suitable, to the airplane where you can reach it with your glow-plug lighter. Cover all the solder joints with Goop or silicone sealant.

THE ENGINE END

Take the side of the snap link with the pin in it, and cut the rest of the link off near the rolled tube base. You can cut the snap link easily with a cutoff disc on a rotary tool, with the snap link held in a vise. Drill out the hole in the remaining blade to 3/32 inch (or however large your glow-plug post is). From the remaining end of the lamp cord (with the 3-inch split), identify which wire is connected to the plug post (the one soldered to the house wire) and which is soldered to the nut. Push the wire whose other end is soldered to the plug post into the pushrod hole in the bottom of the snap link, and push 1/4 inch of the 0.032-inch wire into the blade end. The 0.032 wire goes over the hole in the blade and touches the blade near the hole; cut off any excess wire. Solder this assembly inside the snap-link tube, and shrink the shrink tube over it so that only about 1/4 inch of the snap link is showing (get as close to the hole in the blade as you can). To finish the engine end of your remote plug lighter, simply crimp or solder the no. 6 ring connector to the loose end of the lamp-cord wire that is soldered to the nut.

YOU'LL NEED

- 1 solderable snap link (the kind that is shiny, not black)
- 1 no. 6 nylon insert locknut
- 1 piece of no. 14 solid house wire (Romex), about 7/8 inch long, with insulation
- 1 inch of 0.032-inch music wire
- 1 piece of flexible dual wire no. 18 lamp cord (length to suit application)
- 1 1½-inch-long piece of 1/4-inch-diameter shrink tube
- 1 solderable or squeeze-on no. 6 ring connector, size 18 G1 (pink insulation)
- 1 piece of 1-inch-square 1/8-inch ply with a 1/4-inch hole (change size to suit application)

INSTALLATION

The hole in the snap link fits over the glow-plug post, and tension from the 0.032 wire holds it on, even under severe vibration. The shrink tube insulates the clip from the cylinder head and from the glow-plug base. Attach the lead with the no. 6 ring connector under a motor-mounting bolt to ground the glow plug. Use larger ring connectors for larger motor-mounting bolts, if needed. You can modify the ply mounting piece to any shape or size that is convenient for installation on your model.

A no. 6 locknut is the perfect size to fit your plug lighter, and a piece of hard house wire serves as your remote plug post. Solder one wire to the nut for a ground and the other wire to the post, then cover all the solder joints with silicone glue.

When installed, this simple remote glow lighter will help protect both you and your model. It will allow you to start your engine with your hands well away from the prop, and it will eliminate the need for cutting unsightly and inconvenient holes in your cowl.

Hangar 9; *distributed by Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.* ✚

PRODUCT WATCH

Latest product releases

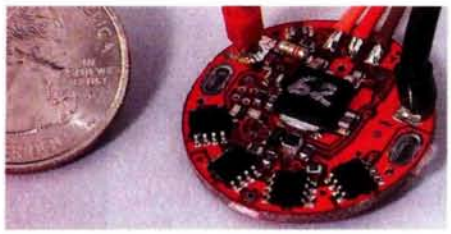
AT *MODEL AIRPLANE NEWS*, we not only tell you what's new, but we also try it out first to bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."

SCHULZE

Slim-15be Speed Control

"Quarter"-scale ESC

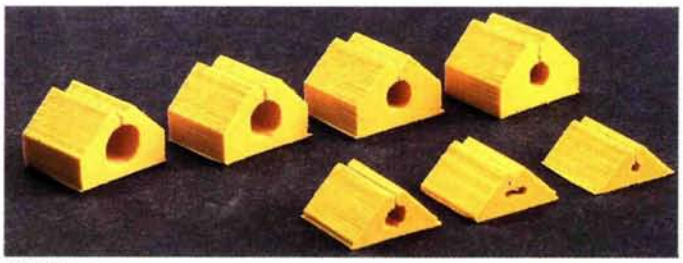
The Slim-15be is a microcomputer-controlled speed control that was developed and manufactured in Germany by Schulze and is distributed in the U.S. by R/C Direct. It is one of a series of tiny BEC-equipped speed controls that works with 5 to 12 cells and current ratings ranging from 8 to 65 amps. The Slim-15be has a current rating of 15/20 amps and can handle 6 to 10 cells. It is 28mm in diameter, 6mm thick and is designed to be soldered directly to the terminals of a Speed 400 motor. It comes with battery leads already attached but without any battery connector. The instructions state that it is essential to use polarized, gold-plated-contact connectors; using any other type invalidates the Slim-15be's warranty. The lead for connection to a receiver's throttle channel is already attached. This unit is intended for small models but has a high-capacity BEC circuit (5V/1.5A) suitable for up to three servos. The Slim-15be also has a brake feature, so it can be used to control motors with folding props.



The Slim-15be incorporates an "IPS" (intelligent programming system) with no pots! It automatically configures itself to the transmitter's stick travel every time you connect the battery pack. It can also be configured to eliminate the brake and to provide a "soft start" for geared motors. The Slim-15be can be configured by following a specific sequence of setting the stick position, turning on the transmitter and attaching the battery pack. During the configuration process, the motor acts as a loudspeaker to give you audible confirmation of the procedure. This truly amazing device sells for less than $40.

—Jim Onorato

R/C Direct, 4444 Convoy St., San Diego, CA 92111; (858) 277-4531.



J'TEC

Clamp Loks

Get a grip!

Sometimes a product comes along that is so simple yet effective that you wonder why someone hasn't thought of it before. J'Tec's Clamp Loks are just such a product. They are molded rubber "clamps," approximately ½-inch square, designed to keep radio system wiring from dangling freely inside a model. They come in seven sizes and differ on the size and shape of the openings in which the wires are held. The smallest holds a single wire, and the largest holds several wires; there's even one with an oval-shaped opening to hold flat, multi-wire cables. All have a slit at the top through which the wires are inserted, and they are extremely simple to use. To neatly and securely keep all those servo and battery wires in the fuselage, you simply CA one or more Clamp Loks to the inside of the fuse and snap the wires into the Loks. The wires stay securely in place but can be easily removed when you want to remove the radio gear. You can also use the Loks to hold pushrods or receiver antennas inside the fuse or as standoffs to hold landing gear fairings to wire struts.

Clamp Loks come in packages of from 18 to 21, either as an assortment of all seven sizes or one specific size for $9.95.

—Jim Onorato

J'Tec, 660 Pacific Ave., Oxnard, CA; (805) 487-0355; www.jtecrc.com

LRP ELECTRONICS

Quick & Easy digital charger

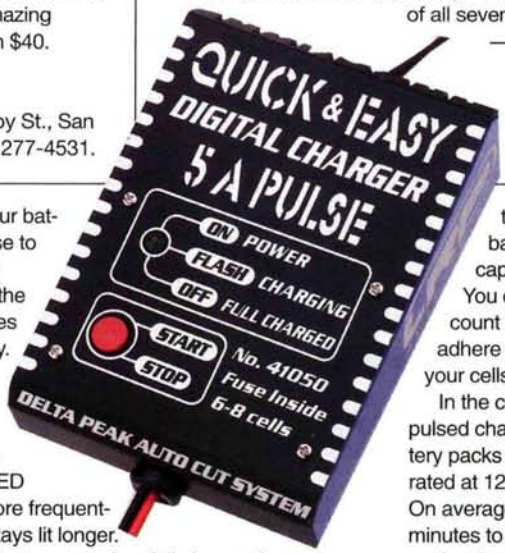
The name says it all

LRP Electronics of Remshalden, Germany, offers a new Quick & Easy digital charger that employs a delta-peak auto cutoff system. It is recommended for 1200 to 4600mAh 6- and 7-cell packs and 500 to 3600mAh 8-cell packs.

The Quick & Easy comes in a metal case that's just 4½x3x1½ inches. The output cable is 45 inches long and terminates in two large alligator clips. These can be attached to a 12V car battery or to a 12V, AC-driven indoor power supply. An 11-inch-long output cable goes to your battery pack and is supplied with a Tamiya connector. You can use that connector or an adapter, or you can simply remove and swap it for a connector of your choice.

When you first plug the Quick & Easy into a 12V input source, the single green LED on the front panel glows steadily. Keep in mind that this charger employs a pulsed output, so it is difficult to monitor the actual charge current because it is constantly changing. On average, the trickle (or reduced level) charge is around 1 amp, although it can briefly go as high as 1.7 amps.

The next step in the charging process is to connect the battery pack to the output and then press the start button; the green LED will begin to flash. If your battery is close to being fully depleted, the LED flashes very slowly. As the fast-charging continues, the LED flashes more frequently, and it stays lit longer. As the battery approaches full charge, the green LED remains on almost steadily. Finally, at peak-detect cut-off, the fast charging ceases; the charger reverts to the trickle level, and the green LED goes out.



The instructions are reasonably good but lose a little in the translation to English. They indicate that 1200 to 4600mAh, 6-cell Ni-Cd battery packs will be charged at a pulsed 4 amps average current. Although 7-cell Ni-Cd packs may have a 1200 to 4600mAh capacity, the average pulsed charge current is only 2.2 amps with the extra cell. An 8-cell pack may also be charged as long as the capacity falls within the 500 to 3600mAh range. The average pulsed charge current for 8-cell packs is around 0.8 amp (800mA).

An important point with the Quick & Easy is not to attempt to charge a 6- or 7-cell Ni-Cd battery pack of less than 1200mAh capacity or 8 cells of less than 500mAh. You can't adjust the current or select a cell count on the Quick & Easy, so you must adhere to these restrictions to avoid damaging your cells.

In the course of testing, I did verify that the pulsed charge current using 6-, 7- and 8-cell battery packs was as stated. Two of the packs were rated at 1250mAh and one was rated at1900mAh. On average, a fully depleted pack took about 20 minutes to reach full charge. Obviously on 8-cell packs, the current is lower, and therefore the charge time is longer, but the Quick & Easy's performance was very repeatable in all of my testing.

If you are looking for a very compact peak-detect charger that doesn't require manual setting or adjustment to charge your 6- to 8-cell Ni-Cd packs, consider the LRP Quick & Easy.

—Bob Aberle

LRP Electronics, Wilhelm-Enssle-Strasse 132-134, 73630 Remshalden, Germany; phone 1149-7181-4098-0; fax 1149-7181-4098-30; www.lrp-electronic.de. LRP products are also distributed in the U.S. by **Team Associated,** 3585 Cadillac Ave., Costa Mesa, CA 93636; (714) 850-9342, fax (714) 850-1744; www.teamassociated.com.

SLIMLINE MFG. CORP.

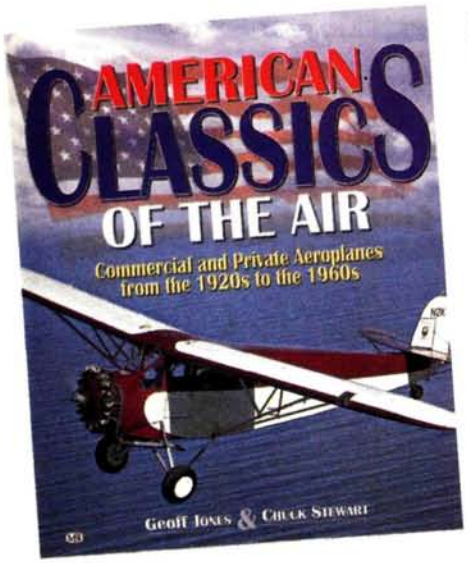
M1 Manual Fuel Pump

Get pumped up!

Many devices on the market can be used to fuel model planes: they include syringes, pressure systems, electric pumps and manual pumps. The M1 manual pump is the latest in a series of accessories from Slimline, and it comes as a complete fueling system—nothing else to buy. It includes a composite manual fuel pump, a CNC-machined O-ring cap, a mounting bracket, 40 inches of silicone fuel tubing and all hardware. It can be mounted directly on a standard 1-gallon container or attached to a flight box.

The CNC-machined O-ring cap keeps fuel factory fresh and prevents it from spilling. This sturdy, well-made pump delivers approximately ⅓ ounce of fuel with each turn of the crank. When installing the fittings in the cap, make sure you get a leaktight seal; otherwise, air could be drawn into the line while filling. I added small O-rings to mine to ensure a good seal. The system, intended for glow fuel only, sells for $34.99. —*Jim Onorato*

Slimline Mfg. Corp., P.O. Box 3295, Scottsdale, AZ 85257; (480) 967-5053; fax (480) 967-5030; www.slimlineproducts.com.



ZENITH BOOKS

"American Classics of the Air"

Picture perfect

Written by Geoff Jones and Chuck Stewart, "American Classics of the Air" is a wonderful, all-color book of commercial and private airplanes from the 1920s to the 1960s. It has 112 pages and 205 vivid pictures of beautiful and historically significant aircraft. Combining air-to-air, static ground and interior and exterior close-up detail photographs, it richly documents the technological progress of civil aviation over a 50-year span. In all, 39 airplanes are illustrated, along with brief descriptions of each aircraft type.

A two-page appendix lists information on more than 75 antique and classic aircraft clubs and organizations—a very helpful source for anyone who's researching a scale model airplane. From the Travel Air 4000 and the Fairchild (Kreider-Reisner) KR.21, the Ryan STA, Stinson Reliant and the Ercoupe 415E to the Beechcraft Model 35 Bonanza and the Grumman G-37 Mallard, many of the really popular airplanes are shown. I was especially pleased to find several photographs of the little-known General Aircraft G1-80 Skyfarer. The softbound book costs $24.95 and is available from Zenith Books.

Whether you're looking for a nice coffee-table book or you just enjoy looking at pretty pictures of classic airplanes, this book will make a great addition to your aviation reference library. I highly recommend it.

—*Gerry Yarrish*

Zenith Books, MBI Publishing Co., 729 Prospect Ave., P.O. Box 1, Osceola, WI 54020-0001; (800) 826-6600; www.motorbooks.com.

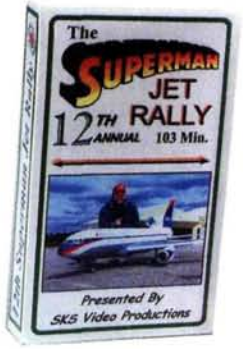
SKS VIDEO PRODUCTIONS

Videos

It's showtime!

Those of us who've been bitten by the RC bug frequently turn to videos to sustain us when not at the field or in the shop. SKS Productions helps to fill that need with three new releases. The first covers the 10th annual Skymasters RC Float Fly held in Island Lake State Park in Brighton, MI—a pristine flying site with a 40-acre lake and a 1,000-foot-long beach. Many of the 100 floatplanes appear in this very professional production. Included are a Maule Rocket, an Eindecker, a Citabria, a Top Flite Cessna, Seamasters, a Canadair, Northstars, an electric Lazy Bee and a Sikorsky S-39. There is also some really neat in-flight footage from onboard cameras. Run time is 92 minutes.

The second video is the "12th Annual Superman Jet Rally" held in Metropolis, IL. This tape features a wide range of turbine and ducted-fan aircraft including Chuck Spoto's Raptor, Lee DeMary's MiG 15, the new BVM F-100, the new JMP Firebird, Century Jet's new F-9F, Fiberclassic's Eurofighter and the new RAM 500 turbine. There's even a DC-10, an L-1011 and a turbine-powered helicopter. The camera work is excellent, and the run time is 103 minutes. I particularly liked the in-flight shots from the onboard cameras and the ground-level shots. The latter made the taxiing jets look like the real thing.



The third, though not an RC video, is no less entertaining. It covers the 20th Anniversary Florida International Airshow at the Charlotte County Airport in Punta Gorda, FL. This tape is produced by Anderson Video Productions and distributed by SKS. Run time is 45 minutes. It features many outstanding demonstrations, including performances by the Swift Magic Aerobatic Team in their three Globe Swifts, Jimmy Franklin in his jet-assisted WACO, the Bud Lite Micro Jet, Patty Wagstaff, and the famous U.S. Navy Blue Angels Team of six F/A-18 Hornets as they close the show with their exciting and fast-paced aerobatic maneuvers.

The videos cost $19.95 each and are a must for any model aviation enthusiast.

—*Jim Onorato*

SKS Video Productions, 85 Pine Rd., Abbottstown, PA 17301; (800) 988-6488; fax (717) 259-6379; www.sksvideo.com; scott@sksvideo.com.

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EVENTS

"T.O.C. OF MARYLAND– 2001" will not be held this year so that we can host the Mason/Dixon Aerobatic Challenge IMAC competition, June 1, 2 and 3, 2001. Food, raffles, prizes, free-style demos. For more info, contact: Andy Kane, (301) 236-9222, or Art Vail, artvail@aerols.com. [7/01]

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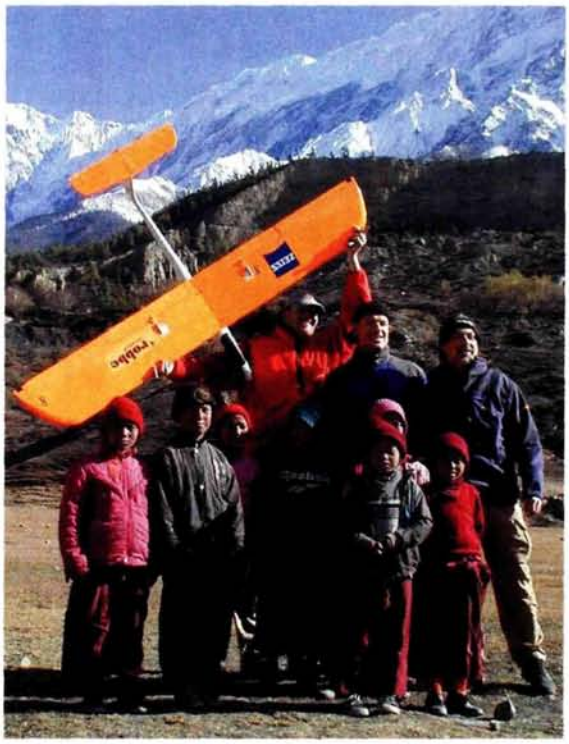
Advertisers

RC at the top of the world

As I write this, a group of modelers is experiencing a fantastic adventure in the Himalayan mountains. In an email from Nepal, aeronautics/space scientist Dr. Wolfgang Schaeper provided these photos and details about some extreme use of electric-powered models for scientific research.



He writes, "About a year ago, the University of Munich asked me whether it was possible to fly at high altitude under stormy conditions to record meteorological data in mountain valleys. They knew about my solar altitude record of 2,065 meters in May 1999 and thought I could do such a job every day during a six-week expedition to the Himalayas, piloting from ground, of course. (They did not know that I had piloted my solar model from a hot-air balloon that was at the same altitude as the model for the entire flight.)

"The meteorologists required a maximum altitude of 1,500 meters (5,000 feet) from the ground, which was defined as up to 3,900 meters (13,000 feet) above sea level. Using head-mounted binoculars with 3x magnification, I would be able to pilot a model that was flying 2,000m from the ground.

"I agreed to develop a model for that purpose. Key elements were a gyro to stabilize the model in high-altitude winds and specially trimmed Robbe/Futaba RC gear.

"The meteorological payload (to measure pressure, altitude, temperature and humidity) was developed by Dieter Wuertenberger. Fortunately, the payload, including its power supply, weighs only 85 grams (3 ounces), which is negligible compared with the model's airborne weight of more than 3 kilograms (7 pounds).

"The drive system uses the benefits of the latest Hacker brushless motors, the ceramic-bearing Maxon 4.4:1 reduction gear and Panasonic's new 3000mAh NiMH cells.

"In the fall of 2000, after more than 40 flights, I felt secure enough to try to reach the world altitude record for an electric RC model—2,026 meters. This record had been held by Russian Anatoly Dubinetsky for more than nine years.

"The flight was very similar to many of the test flights. Launch was in calm air. Wind speed above 400 meters was 10 to 12 meters per second; only slightly less than the flight speed of the model, which was 12.8 meters per second during climb. I headed the model into the wind. Major turns were not necessary. While I piloted the model, judges observed the model using binoculars. The Friedrichshafen Airport tower, about 10km away, had cleared the air traffic during my flight.

"I cut off the motor after 7 minutes of continuous climb, believing that the record altitude had been reached; I did not want to climb too high only to lose the model. After flying 18 minutes, we landed the model. The onboard altimeter showed that the model had flown 2,205 meters above ground—nearly 200 meters higher than the existing world record! Our request for official recognition of this German [national] and world record is under way."

By the end of January 2001, 11 wings and fuselages had been built. All models are equipped with RC components, six of them with complete drive sets. So far, the team has flown to Nepal and farther on into the Kali Gandaki Valley under the famed Annapurna peak, then hiked many miles over 14,000-foot-high passes toward the Tibetan border. The team will now hike down the valley, flying at various locations.

When Dr. Schaeper returns, he will be able to report fully on an exciting expedition to places where no one has ever thought about flying electric models—or any type of models, for that matter. Stay tuned for more information about this RC journey to the top of the world.

SPECIFICATIONS

Model name: Kali 1

Wingspan: 207cm (81.5 in.)

Length: 129.5cm (51 in.)

Wing area: 60.4 sq. dm. (936.2 sq. in.)

Weight: 3kg (7 lb.)

Battery: 14 Panasonic HHR300SC (NiMH)

Motor: Hacker brushless H50 26-S with Maxon ceramic 4.4:1 gear

Prop: carbon Aeronaut CAM 16x10

ESC: Simprop Magic Control

RC gear: Robbe/Futaba FC-28 PCM with Robbe FS 500 servos

Gyro: Ikarus Wing Gyro